# THE ROCKEFELLER FOUNDATION

## Annual Report

1920



The Rockefeller Foundation
61 Broadway, New York

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Annual Report for 1920

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1921

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*Died April 4, 1921.
**Resigned February 28, 1921.

# THE ROCKEFELLER FOUNDATION

## President's Review

To the Members of the Rockefeller Foundation:

Gentlemen:

I have the honor to transmit herewith a general review of the work of the Rockefeller Foundation for the period January 1, 1920, to December 31, 1920, together with the detailed reports of the Secretary and the Treasurer of the Foundation, the General Director of the International Health Board, the General Director of the China Medical Board, and the Director of the Division of Medical Education.

Respectfully yours,

GEORGE E. VINCENT,

President.

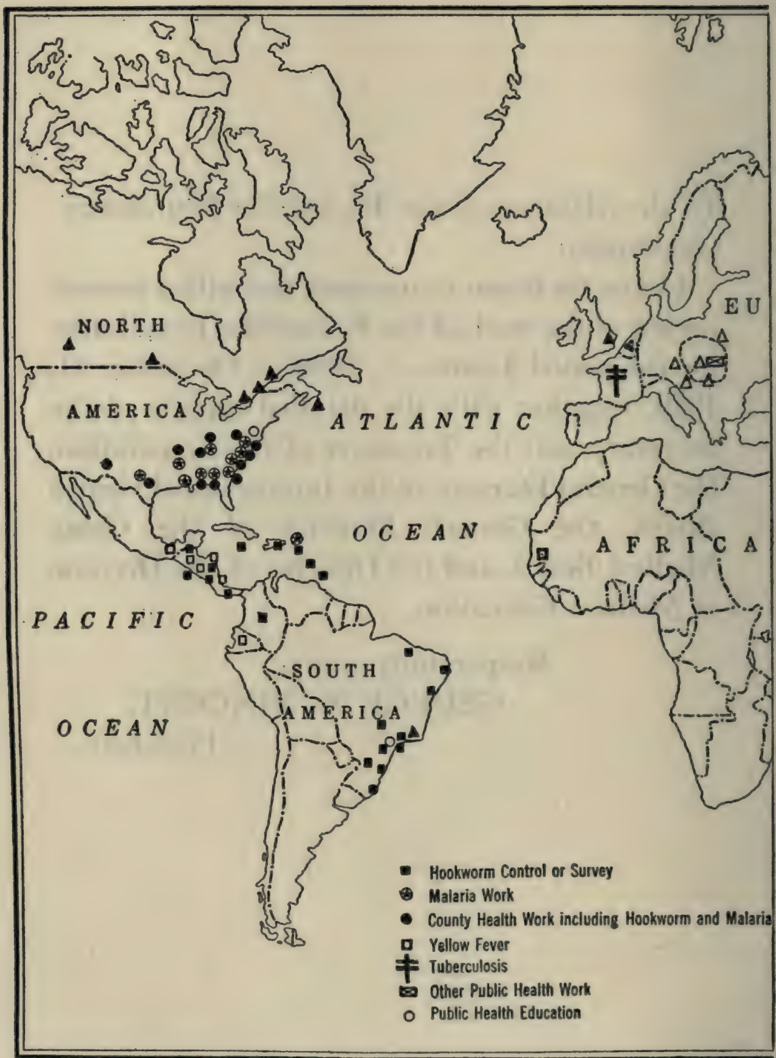



Fig. 1.—World map of activities of


Rockefeller Foundation during 1920

# PRESIDENT'S REVIEW

## The Year in Brief

During the year 1920 the Rockefeller Foundation (1) aided six medical schools in Canada, (2) gave a large sum to a medical training center in London, (3) appropriated a million francs for the Queen Elisabeth Foundation for Medical Research in Belgium, (4) agreed to contribute toward the complete rebuilding of the medical school of the University of Brussels, (5) provided American and English medical journals or laboratory supplies for eleven medical schools and medical libraries in five European countries, (6) continued to construct and to maintain in Peking, China, a modern medical school with a pre-medical department, (7) aided thirty-one hospitals in China to increase their efficiency in the care of patients and in the further training of doctors and nurses, (8) supported the School of Hygiene and Public Health of the Johns Hopkins University, (9) contributed to the teaching of hygiene in the medical school at São Paulo, Brazil, (10) provided fellowships in public health and medical education for ninety individuals who represented thirteen different countries, (11) brought to the United States commissions of medical teachers and hygienists from England, Belgium, and

Czechoslovakia, (12) continued to support a campaign against yellow fever in South and Central America and in West Africa, (13) aided government agencies in the control of malaria in ten states of the South, (14) prosecuted hookworm work in nine southern states and in eighteen foreign countries, (15) helped to expand anti-hookworm campaigns into more general health organizations in counties, states, and nations, (16) brought a war-time anti-tuberculosis work in France to the point where it could soon be left entirely in French hands, (17) assisted the government of Czechoslovakia to reorganize its public health laboratory system, (18) rendered various services in organizing committees to study the training of nurses and of hospital superintendents, lent experts for conference and counsel, sent officers abroad to study conditions, etc., (19) brought to a close its participation in war-time emergency relief by giving a million dollars to the fund for European children. These things were done in part by the Foundation but chiefly through its departmental agencies—the International Health Board, the China Medical Board, and the Division of Medical Education.

### From Cure to Prevention

A railway spends more money on train and track inspection than on wreck crews. The

Fig. 2.—New medical school building of McGill University, Montreal


Fig. 3.—Medical schools of Canada receiving Foundation aid

average automobile owner is on the watch for signs of motor trouble and does not wait until there is a breakdown. The factory manager looks solicitously after his machines and does all he can to guard against interruptions in production. The human body, which is vastly more complex than any machine, is in need of vigilant care and frequent examination. Yet for the most part it is neglected until pain and disability sound an unmistakable alarm. Then the doctor is called in and too often is expected to do the impossible. He is thought of as a wreck crew rather than as a train and track inspector.

It is often said that if all available knowledge about the causes of disease were actually applied the world over, millions of lives could be saved every year. This statement is true, but it may easily mislead. One is likely to infer that enough public health officers and sanitary engineers could usher in a hygienic millennium. But the thing is by no means so simple. The public authorities at best can control wholly or in part only about 20 per cent of the diseases by which people are crippled or killed. Typhoid, scarlet fever, smallpox, and malaria can be either entirely prevented or kept from spreading; but tuberculosis, measles, diphtheria, pneumonia, influenza, and many other maladies are either less perfectly understood or do not respond so readily to control efforts.

Valuable as this community protection against contagious diseases is, it must be remembered that about 80 per cent of the menace to life is not dealt with, at any rate directly, by public authorities. The idea of prevention, then, will have limited influence until it is accepted not merely as a government policy but as a guiding principle in individual lives. Education of whole communities and nations, changes in habits of thought, a new attitude toward disease and toward medical service, are essential conditions of progress. So far from discarding the doctor, this new régime will give him a changed but no less indispensable task. He will increasingly be called upon to keep his patients well. The emphasis is shifting from cure to prevention. The consequences for the training of doctors are vital and fundamental.

## Training the Modern Doctor

Early medical training was an apprenticeship. The prospective doctor was for a premium or fee taken as a pupil by a physician. The neophyte learned by spending his time with his master as he went the rounds of his patients, compounded drugs in his dispensary, and, it may be, walked the wards of a hospital. Gradually this system was superseded by the proprietary school in which a group of doctors in connection with a hospital offered a course of training of a more

systematic kind. Such schools were generally a source of revenue to the teachers. The expenses were slight and the tuition fees often reached a substantial total. The proprietary school has of late yielded to the endowed or state-supported medical school, which is usually connected with a university. Modern medical education can no longer be maintained on a commercial basis. It is an essential social task for which private or government aid must be provided.

The reasons for this change are not far to seek. The sciences which contribute to a knowledge of the human body and its processes, and the technical resources of treatment and prevention, have grown enormously and are steadily developing. Well-equipped laboratories in charge of highly trained persons, and elaborately organized hospitals with teaching and research facilities under the control of physicians who give all or a large part of their time to the care of patients, to instruction, and to investigation, are absolutely essential for a modern medical school of high rank. Even schools on lower levels must possess in equipment and staff a minimum which calls for substantial sums. To meet this demand for increased support, states have made large appropriations and privately supported universities have received generous gifts. The Rockefeller Foundation has decided that in no more fundamental

way can it contribute to progress than by helping strategically placed medical schools in various parts of the world to increase their resources and to improve their teaching and research.

### From Edmonton to Halifax

In connection with a gift made in December, 1919, Mr. Rockefeller expressed the hope that aid might be rendered to Canadian medical schools. A study was therefore promptly undertaken as a basis for making appropriations. Statistics were gathered, maps prepared, personal interviews held with representatives of all nine Canadian medical schools. In this way a fairly clear picture of the situation in the Dominion was obtained. One saw that the country fell into more or less distinct areas each of which has a certain self-contained unity: the Pacific Coast, the Western Provinces, Ontario, French Quebec, and the Maritime Provinces. Capitals for these regions have been established. Medically these capitals are Edmonton, Winnipeg, Toronto, Montreal-Quebec, and Halifax.

A comparison between the United States and Canada with respect to medical schools and doctors is of interest. The United States has a medical school for every million and a quarter of inhabitants; Canada, 1 for every 900,000. South of the boundary there is one medical student for

every 8,000 of population; north of the line the ratio is 1 to 3,700. When it comes to doctors, the situation is reversed. "The States" have 1 doctor to 720; the Dominion 1 to 1,050. This is to be accounted for largely by two things: emigration of Canadian doctors, and the very large output of American doctors during the era of the old proprietary schools. There is a wide variation in the ratio of doctors to population in the different parts of Canada. Thus in Ontario it is 1 to 800, in Nova Scotia 1 to 950, in Alberta 1 to 1,100, in New Brunswick 1 to 1,350, in Yukon 1 to 1,400, and in Newfoundland 1 to 2,500.

It is estimated that Canada needs each year 300 new doctors. Existing medical schools are easily able to provide this number. The obvious need is to increase the resources of the strategically placed schools. It is evident that the Dominion must find a way to distribute its physicians more widely and to bring preventive medicine, hospital care, and medical and nursing service within the reach of the too generally neglected rural population. Precisely the same thing is true in the United States.

### Five Millions for the Dominion

The study once made, the facts seemed to indicate clearly the institutions to be aided. Each was asked to prepare its own plan of future growth.

Toward the realization of such plans the Rockefeller Foundation made contributions. Dalhousie University, Halifax, received half a million for its admirable scheme, which included the participation of the Provincial Government, the Halifax dispensary, a Salvation Army maternity hospital, the city of Halifax, and other agencies.

The distinguished medical school of McGill University, Montreal, was given a million for endowment in connection with a plan which called for more than an equal sum for new buildings and other improvements. Toronto University for its notable medical school was also voted a million toward a total to which the Provincial Government and friends of the University contributed. The University of Manitoba, Winnipeg, received a half million which was supplemented by government grants for both buildings and maintenance.

Two Canadian medical schools which are in process of reorganization were dealt with in a different way. The University of Alberta, which is expanding its course from a partial to a full curriculum, was voted $25,000 for the academic year 1920-1921. The medical school of the newly organized University of Montreal was given an equal amount for its pre-medical courses. The former institution is a Provincial university which has close relations with an experiment in

rural hospitals and public health. The latter is a French-Catholic university which has recently succeeded in raising five millions for buildings and endowment.

In addition to the three millions already appropriated, the Foundation has set aside two millions for Canadian medical education. The interest on this sum, pending the distribution of the principal, will be devoted to annual subsidies, fellowships, and other forms of aid. It is perhaps worth noting that the Dominion appropriations are being paid in United States currency, which in terms of Canadian money adds about 10 per cent to the gifts.

### "Walking the Hospitals" in London

This familiar phrase reflects the importance which the London medical schools attach to bedside teaching. These schools show traces of the earlier régime of apprenticeship and of private organization. A group of physicians who form the staff of a hospital conduct bedside and dispensary instruction. The medical school, recognizing that laboratory training in anatomy, physiology, bacteriology, pathology, and other subjects is essential, appoints specialists who teach, for the most part in a specifically practical way, the sciences and arts which bear upon the care of the sick.

In course of time, mainly out of students' fees, these hospital schools have furnished themselves with teaching laboratories in the essential medical sciences, but they have not had the funds with which to provide for the laboratory sciences buildings, equipment, or staff on what may be called a university basis. The courses have been as a rule restricted to a somewhat narrow but thorough drilling in those phases of the subjects which are immediately applicable to the making of the practitioner. English students who desired a more fundamental and general laboratory training have usually resorted to the older universities, where physiology and chemistry, especially, have been developed by a succession of great teachers and investigators. Thus the English medical school does not typically combine both university and professional work to the same extent as is the case in Germany and to some degree in the best schools of the United States and Canada. There is reason to believe that this separation between university laboratory training and bedside teaching is detrimental to both.

It is true, however, that the British schools have developed a system by which the future practitioner is given a thorough practical training in the wards and in the dispensary. As a *dresser* and *clinical clerk* the English medical

student, under the close supervision of the staff, renders service to the patient, makes first-hand examinations, and assumes responsibility to an extent not equaled anywhere else in the world. This system is, so far as bedside teaching goes, the most significant contribution of British schools to the problem of training the doctor. It is an outgrowth of the apprenticeship idea at its best. The *clerkship* is, however, not the sole contribution of British medicine to modern medical education. Equally original and stimulating is the conception of individual laboratory training, which, beginning in physiology, has now spread to all the laboratory subjects.

In London as elsewhere there has been of late a demand for teachers whose chief, even sole, responsibility shall be for bedside instruction and research in the hospital. Although in every generation able English physicians have taught students and investigated disease with brilliant success, it has become increasingly clear that doctors who give themselves primarily to private and consulting practice cannot alone successfully meet the needs of students or the demands of research under modern conditions. The Royal Commission on University Education in London, reporting in 1913, strongly urged the introduction of clean-cut university standards and ideals into the clinical departments of the

London schools. This suggestion, together with other influences and considerations, led the British Government in January, 1920, to begin an experiment in the field of full-time clinical teaching. By grants of public funds *units* were established in four of the London schools. The *unit* consists of a salaried chief and two assistants in medicine or surgery who give their entire time to teaching and investigation in the hospital. The head of the *unit* was conceived as a university professor.

### University College Hospital

The medical schools of London have, then, in the main, developed as professional schools for the training of practitioners, more or less cut off from the productive centers of medical science and from university control and influence. This is not to deny that many of these schools have enlisted the services of notable men, have made important contributions to medical knowledge, and have given an effective practical training. But at best these hospital schools, whose clinical teachers were generally prominent consultants, could not create the richer and more stimulating environment that has come to be essential in a university medical school.

The one partial exception to the London type is University College Hospital Medical School,

Fig. 4.—The University College Hospital, London


Fig. 5.—View of portico, University College, University of London.
(From the drawing of a student of the school of architecture)

which, as originally established in 1828, was in form a unified university school, with a hospital built primarily for teaching purposes. The medical sciences—physiology, chemistry, and after a while even pharmacology—were developed within University College; the clinical staff, too, was created by University College, though in composition it did not essentially differ from that of the hospital schools.

In 1904, to meet requirements of the University of London, the school was separated into two faculties, and the hospital was put under an independent board. While this did not destroy the geographical unity of the laboratories and the hospital, the change did not make for that community of interest and that constant comradeship among laboratory scientists and bedside teachers which are now deemed so desirable.

In 1919 several causes combined to precipitate a new movement at University College and Hospital. The war had broken the "cake of custom"; a number of able and alert men in both faculties were eager to take a forward step; two *units* of full-time professors had been planned for the hospital; a scheme for expansion in both buildings and teaching staff was being discussed. Moreover, if something were not done, there was danger that important men would accept attractive appointments elsewhere. The posture

of affairs was almost critical. Should University College Hospital Medical School return to its original form as far as possible and consciously develop the possibilities inherent therein, seeking a real unity, or should it drift with the tide?

### A Gift to British Medicine

At this juncture two representatives of the Rockefeller Foundation arrived in London on their way to the continent. Recognizing the possibilities of the University College and of the Hospital and Medical School, the Americans suggested that the Foundation might lend a hand. Tentative plans were worked out and provisional estimates were made. In February the trustees of the Foundation considered these preliminary proposals, expressed an interest in them, and invited the authorities of the College and of the Hospital and Medical School to send a joint committee to the United States. As a result of subsequent negotiations the trustees authorized in May the concluding of an agreement by which the Foundation promised to contribute about five million dollars toward the realization of the new plans of the University College groups.

This sum is almost equally divided between buildings and endowment for increased educational and research activities. The more important items in the building scheme are: an in-

stitute of anatomy, a lying-in pavilion for sixty patients, a home for nurses, a house for resident physicians, and the remodeling of the hospital to provide additional beds, clinical laboratories, and new operating suites. When the work is completed, this medical center will have an admirable modern plant and equipment, with a fully-controlled hospital of 500 beds and a large out-patient department. The new arrangement is by no means one-sided so far as the Rockefeller Foundation is concerned. The College and the Hospital authorities assume responsibility for increased expenses of maintenance which will call for substantial sums.

As a part of the understanding for the future the two separate bodies—the University College faculty and the Hospital staff—are each to be represented in the other by at least four professors. It is hoped that this formal inter-locking will be a symbol of the effective team-work between the university laboratory men and the bed-side teachers upon which the success of this unique London medical center will ultimately depend.

### La Fondation Reine Elisabeth

As a matter of fact, the Foundation representatives who opened the negotiations in London were on their way to Belgium to learn what they could about medical education in that

country. When they reached Brussels, they found that Queen Elisabeth was planning to open a modest center for medical research in connection with a large new hospital which the municipality was building in the suburb of Jette near the out-of-town royal palace. The Queen has good reason to be interested in medicine. Her father was trained as a physician and she herself pursued medical courses as a part of her education. During the war she spent much of her time in the Belgian military hospitals and took a leading part in Red Cross work, especially in those activities which had to do with nursing and hospital service.

The Queen's idea is to provide under the directorship of the court physician, Dr. Pierre Nolf, a well-trained medical scientist, a center for research and advanced individual study to which a select number of the most promising graduates of the four Belgian medical schools may resort. A laboratory building is being modernly equipped in the midst of a hospital of more than 1,000 beds. Thus unusual opportunities will be provided for selecting and studying intensively various types of disease. The new institution has been named, in honor of its royal patroness, *La Fondation Reine Elisabeth.* Toward the endowment of this undertaking the Rockefeller Foundation, on the recommendation of its representatives, voted a million francs.

**Unifying the Brussels Medical School**

Of the four schools in Belgium, there seemed good reasons for believing that the Medical Department of the Free University of Brussels offered the most promising opportunity for significant and influential development. As in London, so in Brussels, new plans were being discussed. Dr. A. Depage, the eminent surgeon, had projected on a suburban site a hospital and nurses' training school which should be a memorial to Edith Cavell and to Madame Depage, who lost her life in the sinking of the *Lusitania.* There was dissatisfaction on the part of the bedside teachers with the antiquated municipal hospital of St. Pierre, in which the university instruction was given. The fact that the laboratories were more than two miles distant from the hospital was generally deplored. The annual budget, moreover, was wholly inadequate even on the modest salary level on which Belgian scientists do their work.

After a discussion of the entire situation it was agreed that the University, the City of Brussels, and Dr. Depage should draw up a plan which might be submitted to the Rockefeller Foundation with a view to securing its help. When the proposal was ready, it was decided that there would be an advantage in having this presented

in person by a delegation from Brussels. In the autumn of 1920 the Belgian party came to the United States as guests of the Foundation, visited a number of medical schools, and conferred with representatives of the Foundation with regard to the plan for unifying and rebuilding the Brussels medical plant and strengthening its work. Dr. Depage with fine magnanimity agreed to merge his plans in the one project. In December the Foundation indicated a willingness to give more than three million dollars provided the Brussels authorities could carry out the scheme. In February, 1921, complete agreements were reached and the formal contracts were being prepared. It seems certain that Brussels will have a modern equipment which with the able men available will form the basis for notable progress in hospital administration, nurses' training, medical education, and research.

**Medical Journals and Supplies for Europe**

While the London, Brussels, and Canadian plans are characteristic of Foundation policy, other kinds of aid may in certain circumstances also be desirable. The post-war condition of medical schools in Eastern and Central Europe offered a case of emergency need. For example, in Vienna laboratory supplies such as glassware, rubber tubing, and chemicals were sadly lacking,


Fig. 6.—Aid undertaken in Europe by Rockefeller Foundation

and the university funds were wholly unequal to replenishing the storerooms. In English, French, and American journals and books there was a gap of five years, and at the rates of foreign exchange subscriptions could not be renewed.

Representatives were sent during 1920 to the chief medical centers in Jugoslavia, Czechoslovakia, Poland, Austria, and Hungary. Certain visits were also made to German university towns. On the recommendation of these Foundation agents appropriations for supplies were

made to six medical schools in Prague, Vienna, and Budapest, while promises to make good for a period the loss in exchange on medical journal subscriptions were given to institutions in these and other countries in Western, Central, and Eastern Europe.

With a view to assisting the authorities of the new University of Belgrade (Jugoslavia) to work out wisely their plans for a modern medical school, the university was invited to send a delegation of four to visit Western Europe, Great Britain, and the United States. The Foundation also expressed a willingness to consider fellowship aid for a carefully selected personnel.

### East is West in Medicine

Before the war one could go by the Trans-Siberian Railway from Paris to Peking in a fortnight. The union of West and East seemed imminent. The Suez route is much longer, yet it maintains not only commercial relations but a steady interchange of ideas between Europe and the Far East. The journey from New York to the Chinese capital may be made in three weeks. Western influences are streaming in growing volume and force across the Pacific. In these circumstances modern science and its applications are being rapidly extended. This is true of the medical sciences, of the healing art, of hospi-

tal care, and in some degree of preventive medicine and research. In Tokio, Mukden, Manila, Hong Kong, Tsinan-fu, Shanghai, Changsha, and other centers modern medical training has been established. Throughout the Orient hospitals are approximating in varying degrees the standards of the West.

In Peking the Rockefeller Foundation is building, equipping, and staffing a medical school and hospital on a considerable scale and on a high level. It is hoped that this institution will (1) conduct a thorough and practical undergraduate course for physicians, (2) provide in due time graduate training for men and women who wish to devote themselves to laboratory work, clinical specialities, and teaching, (3) offer short courses for physicians who desire to keep abreast of progress in medical knowledge and skill, (4) afford reasonable opportunities for research, especially with reference to diseases peculiar to the Far East, and (5) help to extend in the Orient a popular knowledge of medicine and public health. In order to insure a thorough grounding in the studies fundamental to medical education, the Peking Union Medical College also maintains a Pre-Medical School. For the academic year 1919-1920 the enrolment of the institution was: pre-medical school thirty-four, medical school (one class) seven, graduate courses two, total

forty-three. For the year 1920-1921 the total will reach seventy-nine.

This Peking center ought in time to become not only an influence in North China and the Republic generally, but a rallying point for medical training and research for the entire Far East. It will maintain constant relations with Europe and North America. From time to time visiting professors from abroad will be in residence. To Peking will resort graduate students of ability and ambition. Practising physicians and medical missionaries will find it a place of stimulation, refreshment, and congenial comradeship. Here, too, there is reason to believe, original contributions will be made to the world's knowledge of disease and its prevention. Already promising beginnings have been reported. The Peking Union Medical College aims at becoming a significant station in the world-wide system of medical education and research.

### Hospitals and Medicine in China

It is one thing to give Chinese men and women a modern medical training; quite another to provide the conditions under which that training can be of largest service to Chinese communities. Unless the native physician can have access to laboratory and operating room, unless he can maintain professional and personal

relations with competent and high-minded colleagues, unless he can count upon a certain confidence in Western methods among his fellow countrymen, the chances of permanent and worthy success are slight. Conservatism, faith in native medicine, family demands for quick commercial returns, absence of publicly enforced standards, temptation to compromise and quackery, beset the path of the Chinese doctor who undertakes to practise scientific medicine in his native land.

The chief agency for helping the native practitioner is the Western type of hospital, which gives him additional education, offers him facilities, aids him in maintaining his ideals, and helps to disseminate in the community knowledge of the aims and methods of both curative and preventive medicine. In carrying out its China plans, therefore, the Rockefeller Foundation is aiding many strategically situated hospitals—for the most part under missionary auspices—to improve their buildings and equipment and to increase the number of their doctors and nurses. Thirty-one institutions of this kind were aided during 1920.

In addition to maintaining the Peking center, the Foundation has, through the China Medical Board, made appropriations to a number of colleges in China for their pre-medical courses and has given aid to a medical school at Tsinan-fu.

Scholarships for Chinese and missionary doctors have also been provided for study in both the Peking Union Medical College and in the United States. Moreover, the knowledge and experience of the Peking staff are available for all who are interested in medical education, hospital planning and administration, nurses' training, and other phases of Western medicine.

### Training Health Personnel

Men rather than money insure efficiency in social effort. Preventive medicine depends for success on the leadership of well-trained and experienced specialists, administrators, sanitary engineers, laboratory workers, nurses, inspectors. To provide a training center for public health personnel, the Rockefeller Foundation agreed in 1917 to support a School of Hygiene and Public Health in connection with the Johns Hopkins University. In 1920 a staff of forty-three gave instruction to 100 students who represented twenty-five states and nine foreign countries.

In establishing the school attention was properly given first to organizing the fundamental departments which deal with the causes of contagious diseases, vital statistics, sanitary engineering, and the like. More recently the curriculum has been completed by providing instruction in public health administration and by affording

students opportunities to apply their knowledge to practical problems in the field. During the summer they have held positions under the United States Public Health Service, the state boards of health, and municipalities. Plans are under way to organize in a community near Baltimore a rural training area in which students will gain experience in the actual work of carrying out a modest and feasible countryside scheme for promoting public health.

During the autumn of 1920 the School conducted a six-weeks' special intensive course for public health officers. Twenty-nine men and women attended and seemed to derive much benefit from the instruction. A short course was also given for members of the staff of the International Health Board who are engaged in hookworm control. These are significant beginnings in putting the scientific resources of the School at the service of workers who are applying practically the results of research. *The Journal of Hygiene* which has been established under the auspices of the School will promote this same end and stimulate research as well.

The Foundation during 1920 continued to contribute to the support of a department of hygiene in the medical school of São Paulo University in Brazil. An American professor and a Brazilian who had been trained under Founda-

tion auspices in the United States were in charge of the department.

### Fellowships for Thirteen Nations

In harmony with the principle that trained leadership is essential to all progress, the Rockefeller Foundation in its desire to promote medical education and public health on an international basis has not limited its aid to centers and citizens of the United States. Through the International Health Board, the China Medical Board, and the Division of Medical Education, promising individuals in thirteen different countries were granted during 1920 fellowships which enabled them to pursue advanced courses in preparation for institutional or government service as teachers, investigators, or administrators.

For training in public health twenty-seven fellows came from the following countries: Czechoslovakia, thirteen; Brazil, five; Canada, two; France, two; Colombia, one; Costa Rica, one; Salvador, one; Mexico, one; Porto Rico, one. Six Americans were also awarded fellowships either as prospective teachers in schools of hygiene or as members of the Health Board staff.

Fifty-seven persons received aid in preparing themselves for medical teaching or hospital service. This number included one Canadian, one Czechoslovakian, two Englishmen, two Brazil-

ians, one Belgian, eleven Chinese graduate doctors, eight Chinese undergraduates, for seven of whom the China Medical Board assumed responsibility when the Harvard Medical School of China closed, four Chinese nurses, and twenty-seven American and British missionary doctors home on furlough from China who desired to take graduate courses in medicine and surgery.

To this total of ninety individuals who were working in the fields of curative and preventive medicine may be added twelve members of the International Health Board staff on study leave, and the eighteen fellows in physics and chemistry who were selected and supervised by a special committee of the National Research Council, to which the Rockefeller Foundation appropriated the necessary funds. Thus, during the year, a total of 120 students were supported in whole or in part by the Foundation.

It should be pointed out that these fellowships do not constitute in any sense an inflexible system in which any given nation has a vested right. The awards are made only to individuals of outstanding ability who have assurances of opportunities to engage in salaried teaching or public health service in their own countries. No aid is granted to persons who are planning to become immediately private practitioners or commercial laboratory workers.

**Following Up Yellow Fever**

In 1916 General Gorgas headed a Commission sent by the International Health Board to South and Central America to investigate and report upon the possibility of putting an end to the menace of yellow fever. The Commission recommended a direct attack upon the seed-beds of the disease in Guayaquil, Ecuador, and Merida, Yucatan, and the investigation of suspected areas in Venezuela, the east coast of Brazil, and the west coast of Africa.

As soon as General Gorgas was retired from the United States Army in the winter of 1918, he was entrusted with the organization of a campaign. Commissions were formed in the countries of Central America, and in Colombia, Venezuela, and Ecuador. Dr. Noguchi of the Rockefeller Institute for Medical Research had already carried on field investigations in Guayaquil and had found a germ which there was reason to believe was the inciting cause of yellow fever. From this organism a vaccine was prepared and administered to test the possibilities of rendering individuals immune to the disease.

Late in 1918 Dr. M. E. Connor of the International Health Board organized, with the hearty support of the city of Guayaquil and the government of Ecuador, a determined attack upon the Stegomyia mosquito, by which alone

the infection is communicated from person to person. The water in which the insects deposit their eggs was either drained away, or screened, or protected by larvæ-consuming fish. To such good purpose was the work done that by June, 1919, yellow fever had disappeared from Guayaquil. On December 1, 1920, the organization was turned over entirely to the local authorities.

An epidemic of yellow fever appeared in Central America in 1919-1920. It was traced to sources of infection in Mexico, which at that time was not ready to join in the common fight on the disease. Prompt measures in Guatemala, Salvador, and Honduras successfully restricted the infection.

A Commission to investigate conditions on the west coast of Africa left the United States in May, 1920. In London a representative of the British Government, and an English bacteriologist who had spent some time with Noguchi in New York, joined the party. General Gorgas was taken ill in London and turned over the leadership of the group to General Robert E. Noble. The Commission spent fifteen weeks in Nigeria, Sierra Leone, the Belgian Congo, Senegal, the Gold Coast, and Dahomey. No actual cases of yellow fever were encountered. Available records and the reported experience of local physicians seemed to indicate that yellow

fever had existed on the coast, but for a time at least had been driven into the back country. The enormous size of the regions involved, the difficulties of travel, the suspicions and secretive tendencies of the native population make it extremely difficult to carry on investigations. The Commission recommended that another group be sent to the west coast prepared to spend some time in studying the situation.

Recently in Mexico the prospects of yellow fever control have brightened. Late in 1920 representatives of the International Health Board were invited to go to Mexico City, a Mexican commission was organized, and there is every reason to hope that the sources of infection in Yucatan and southern Mexico will in due time be brought under control.

Noguchi's vaccine has played a significant part in recent developments of the campaign. At last reports more than 7,500 persons had been vaccinated. While it is still too early to make a definite announcement as to the effectiveness of the vaccine, the results so far are distinctly encouraging. Several Central American countries have agreed to accept certificates of vaccination in lieu of quarantine detention. Representatives of business houses are being vaccinated before they leave for fever-infested areas. Stocks of vaccine, prepared at the Rockefeller Institute,

are now available in all the countries where there is any likelihood that yellow fever may appear.

### General Gorgas Dies on the Field

It was the hope of William Crawford Gorgas "to write the last chapter of the history of yellow fever." He was almost in sight of his goal when he died in London, July 4, 1920. An able and gallant soldier in a campaign against disease, he laid down his life on the field of battle. He was on his way to the west coast of Africa when the end came, and from his death-bed he gave directions for the prosecution of the work to which he was so loyally devoted.

After the American occupation of Cuba in 1898-1902, General Gorgas attained distinction for his notable services in ridding first Havana and then all of the island of yellow fever. These successes led to his appointment as Sanitary Director of the Panama Canal Zone. His remarkable administration of this great task gained for him new laurels. His advice was sought by the British Government, under whose auspices he made a trip to South Africa. From 1914 to 1918 (years which included the stirring period of America's participation in the World War), he served as Surgeon General of the United States Army. As soon as he retired, he entered the service of the International Health Board and

began energetically to organize an international fight against yellow fever. Just before he left for London, he received an invitation from Peru to become the public health leader of that country.

The last days of General Gorgas in Europe brought him new honors. At the International Hygiene Congress in Brussels he was awarded the Harben gold medal in recognition of his services to public health. When the General was ill in the Queen Alexandra Hospital in London, King George called upon him and conferred the Order of St. Michael and St. George. After General Gorgas died, the British Cabinet ordered an official state funeral in St. Paul's Cathedral in honor of this great American soldier who had devoted his powers not to the destruction but to the protection of human life. His career is inspiring the men upon whom have devolved the duty and privilege of seeking to realize his noble purposes.

### Progress in Malaria Control

Since 1915 the International Health Board has been engaged in demonstrating the possibility of ridding small communities of malaria infection at a cost well within their resources. Experiments in towns in Arkansas and Mississippi have proved that the infection can be reduced by from 75 to 95 per cent at an annual

per capita cost, varying with conditions, from 45¢ to $1.00. During the war the United States Public Health Service was strikingly successful in reducing malaria infection in the areas surrounding the army camps. From the outset the state boards of health and local authorities had a part in these undertakings.

As a result of a conference held in 1919, the United States Public Health Service, state boards of health, the International Health Board, and local authorities joined during the summer of 1920 in a concerted demonstration which included fifty-two towns in ten southern states. Each partner in the enterprise contributed personnel or funds, or both, to a common staff and a common budget. The machine worked smoothly. The specific results were gratifying. Adequate control was secured and the amount of malaria was definitely reduced at a per capita cost of 78¢, exclusive of central supervision. The by-products in community pride, popular education, and interest in health problems were valuable and give promise of future progress.

While the scientific basis of malaria control is well established, there is ample opportunity for experiment in testing various practical measures under different conditions. The infection is transmitted by the Anopheles mosquito, whose habits are known. Of these the most important

is the depositing of eggs in water. Furthermore, by means of quinine, the blood of an infected person may in almost all cases be sterilized—i. e., the disease may be eliminated. It follows that if the Anopheles can be prevented from breeding or from gaining access to individuals, or if malaria carriers can be freed from infection, the disease cannot survive. In a given locality one or all of these methods may be employed. Where water can be drained away, or covered with a film of oil, or policed by fish that eat the mosquito eggs, Anopheles control may be the sole method. In regions where water is more abundant, resort may be had to screening or to quinine.

In Hinds county, Mississippi, a rural area of thirty-six square miles with a population of 830 was selected in 1918 for an experiment in countryside mosquito control. The work was continued in 1920 and demonstrated that a reduction of 76.7 per cent in the disease could be secured at a cost which is not prohibitive. The top minnow proved to be an effective ally. It is estimated that each minnow eats about 165 large mosquito larvæ and many eggs a day. In Sunflower county in the same state the sterilizing of malaria carriers, begun in 1918, was prosecuted with the result that the rate of infection was still further reduced and the per capita cost lowered. At Mound, Louisiana, experiments in screening

Fig. 7.—Vegetation along the banks of a bayou. Streams like this afford favorite breeding places for the malaria mosquito

Fig. 8.—Experiments are being made in which cows and other domestic animals are enlisted to prevent the breeding of malaria mosquitoes by cropping close the vegetation along the banks of bayous, streams, and ponds. The photograph shows one of the animals used for this purpose

houses were carried out. The records showed that what an old colored woman called "screams" are of appreciable value in malaria control.

For some time the International Health Board has had in mind the possibility of adapting to tropical countries the methods of malaria control which were so successfully employed in Arkansas. During the year a representative was sent to Porto Rico to make investigations. He reported that the conditions were not favorable for applying the Arkansas plan, but that there were good reasons for believing that mosquito control measures adapted to tropical agricultural conditions would yield significant results.

### Cows and Fish Versus Mosquitoes

One anti-malaria experiment in the bayou region of Louisiana is sufficiently novel to deserve a separate paragraph. The bayou is a sluggish stream carrying a good deal of vegetation and affording a favorite breeding place for the Anopheles. By the damming of a bayou and impounding the water for a stretch of several miles, a lake is formed. From this the vegetation is removed, and the top minnows are given their opportunity. The fish eat the mosquito eggs as fast as these are laid. Only one more obstacle is to be overcome. If the vegetation on the banks is permitted to grow freely, it forms a protected

zone in which eggs may be deposited beyond the reach of the top minnows.

In some way the grasses on the banks must be cleaned away if the breeding of the mosquitoes is to be prevented. To meet this need the strips along the bayou are turned into pasture land on which cattle are allowed to feed. The cows crop the grass close along the low banks and leave the larvæ an easy prey to the eager minnows. Thus the natural appetites of minnow and cow work together for the protection of man. Moreover, the dairy and beef industry is fostered in a region which needs diversification of agriculture. It is too early to say whether this experiment will be completely successful; the indications so far are encouraging.

### "Unhooking the Hookworm"

This is the title of a motion-picture film which has recently been made under the auspices of the International Health Board for use in anti-hookworm campaigns in various parts of the world. The hatching of the hookworm, its penetration of the human body, its progress through the blood, lungs, and throat to the digestive tract, its parasitic rôle, its propagation, are set forth vividly by ingenious devices of micro-photography and animated diagrams. Successive scenes illustrate the causes of soil pollution, the process of in-

fection, the symptoms of the disease, the methods of treatment, the results of cure, and the need of sanitary precautions. It is now being sent out for use in different countries and will doubtless be modified as a result of actual tests in the field. Preliminary reports indicate that the film is likely to prove distinctly serviceable in impressing communities with the menace of the infection and with the possibilities of cure and prevention.

During 1920 the hookworm work, always undertaken in concert with government agencies, went steadily forward in nine states of the South. In the West Indies campaigns were prosecuted in Jamaica, St. Lucia, and Trinidad; a survey was made in Santo Domingo; and in Porto Rico, after a field study, relief measures were inaugurated. In Central America work was continued in Guatemala, Nicaragua, Salvador, Costa Rica, and Panama. In South America campaigns were conducted in Colombia and in ten states of Brazil, where government funds in large amounts were provided. In the Far East anti-hookworm measures were carried out in Australia and Papua, Siam, Ceylon, India, Mauritius, and the Seychelles Islands. Thus control or survey services were rendered to forty-two different governmental areas in nineteen different countries of the world. In every case the government

invited aid, assumed increasing responsibility, and looked forward to taking over the entire enterprise.

### Hookworm Work and Health Services

From the beginning of its hookworm campaign the International Health Board has thought of the control of this disease chiefly as a means of demonstrating to a given community in a concrete way the meaning of public health and the possibilities of preventive medicine. The hope has been that countrysides, towns, and states would gradually be educated to the idea of establishing general health organizations.

In the Southern States it has been the policy of the Board to encourage the establishment of county health administrations and through these agencies to broaden the scope of local effort from hookworm disease to other maladies and sources of danger. The Board's assistance has been limited to a few demonstrations and has been conditioned upon state and county appropriations which aggregate half or three-fourths of the total budgets. In the states where the county plan is most firmly established, the Board's aid is gradually being withdrawn. It may be said that so far as the United States is concerned the Board's specific hookworm work is practically at an end. Anti-hookworm measures from now on

Fig. 9.—Scene in India, from the hookworm film

Fig. 10.—Baby clinic: a growing phase of county health work

will be a regular part of the health campaigns of counties and states.

Brazil affords a striking example of the educating effects of anti-hookworm measures. The work began in 1916; in four years it extended to the Federal District and to nine states, which appropriated, for 1921, the sum of $2,300,000 for rural sanitation. Last October a national department of public health was created. Thus, from hookworm measures as a beginning, general public health policies are being formulated.

Queensland, in Australia, two years ago entered into a five-year arrangement with the International Health Board for an anti-hookworm campaign. Last year the work was extended in Papua; now it is proposed to include New Guinea. The undertaking aroused widespread interest not only in this specific disease but in public health generally. An agitation was begun for the creation of a national department of health. Late in 1920 the Far Eastern Director of the International Health Board sailed for Australia. During his stay there Government decided to create the new department.

### Tuberculosis Commission to France Ending Its Work

In the midst of the war (1917) the Rockefeller Foundation sent a Commission to France to aid

that country in organizing a fight upon tuberculosis, by which under existing conditions the population was seriously menaced. The Commission's plan included: (1) demonstrations of dispensary and visiting nurse service in the XIXth ward of Paris and in the department of Eure-et-Loir, (2) training courses for doctors and health visitors, (3) encouragement of the organization of committees and dispensaries in all parts of France, and (4) a campaign of popular education by means of traveling exhibits, lectures, slides, moving pictures, posters, pamphlets, and press articles.

The response of the French Government, private societies, and local communities has been most enthusiastic. In June, 1920, the chamber and senate voted three million francs for tuberculosis work and promised subventions for building sanatoria in all the departments of France. By the end of the year 271 dispensaries were in actual operation and 178 more were to be opened in the early future. Two hundred fifteen diplomas had been granted to visiting nurses who had completed courses of training. The short courses organized in Paris for dispensary doctors were most successful and sent men back to the provinces with a new enthusiasm and a keen appreciation of the possibilities of dispensary service. The educational campaign covered

twenty-eight departments. A railway car was especially equipped for publicity purposes by the Commission and was to be put in service early in 1921.

It has been the intention from the outset to turn the tuberculosis organization over to the French as soon as this can be done in justice to the work and in fairness to governmental and other agencies. The dispensary systems in Paris and in Eure-et-Loir were transferred to the local authorities during 1920. Plans are under way to hand over the remaining activities in 1922. It is hoped that arrangements will be made by which these activities will be carried on under French auspices without any break in continuity or impairment of efficiency. Before 1922 the Commission is likely to be formally recalled, although the services of individuals may be made available for a longer time in connection with certain French agencies.

All Americans who have been connected with the Commission's work have felt it a privilege to be associated with French officials, doctors, private citizens, and communities in this inspiring undertaking. Ties of mutual esteem and good-will have been formed which will help to bind together the two republics.

### Working With Czechoslovakia

One of the early acts of this vigorous new nation was to establish a Ministry of Health. Interested in this development, the General Director of the International Health Board visited Prague and on his return submitted to the Foundation a plan for aiding the new department and the country. The proposal included four items: (1) lending to the government an American expert in public health administration, (2) providing fellowships for a selected group of young doctors pledged to public health work, (3) assisting in the development of a public health laboratory service, and (4) bearing the expenses of a Czechoslovak commission which should study public health administration in England and in the United States.

During 1920 all these things were brought to pass. In July Colonel Frederick F. Russell, the laboratory expert of the International Health Board, set out for Prague. In October nine young Czech doctors arrived in the United States to begin their studies. Mr. Selskar M. Gunn took up his residence in Prague and put his knowledge and experience as a public health administrator at the disposal of the Ministry of Health. A commission was selected and reached the United States in November. After visiting significant centers of public health laboratory

and other services, the commission sailed for England, where further knowledge was gained under the auspices of the British Ministry of Health.

The policy outlined above is based upon the idea that trained personnel, a knowledge of scientific methods, and an appreciation of administrative efficiency are fundamental to any constructive public health work. The unification of laboratory service in close relation with the University of Prague has already suggested the idea of establishing under government auspices a school of hygiene for the training of the laboratory workers, vital statisticians, specialists in epidemics, and administrators who will be needed if substantial progress is to be made.

### Sundry Items of Aid and Service

In addition to the more formal projects which have already been described, the Foundation and its Boards rendered many forms of service and made a number of appropriations. Expert advice about laboratory organization was given to the state boards of health of Alabama, Mississippi, and Kansas. Officers made studies in Europe, Brazil, and China. Conferences were held on nurses' training and on various aspects of hospital administration, and funds were provided to defray the expenses of committees which

are studying these questions. Various projects of the National Committee for Mental Hygiene received Foundation support. Several surveys were made by the Foundation's research department. An exhaustive bibliography of hookworm disease, on which work has been under way for several years, was practically completed. A contribution was made to a hospital service bureau which was established by the American Conference on Hospital Service. A dispensary demonstration in New York City was inaugurated. A bibliographical agency in Switzerland was assisted.

### Applications for Aid

During 1920 approximately 800 applications for aid in various fields were received. The Foundation has restricted its work almost exclusively to a few broad undertakings in public health and medical education. In order to accomplish results of value in these, it finds it necessary to decline applications for projects in other fields, although it recognizes that many of these applications are for items of great value in themselves.

Table 1 lists the applications received and acted upon during the year 1920.

## TABLE 1: APPLICATIONS FOR AID RECEIVED AND ACTED UPON DURING 1920

| CLASSIFICATION OF APPLICATION | RECEIVED | GRANTED | DECLINED |
|---|---|---|---|
| 1. Public Health | 68 | 6 | 62 |
| 2. Medical and nursing education and medical research | 103 | 36 | 67 |
| 3. General education (including educational projects and research other than medical) | 83 | 4 | 79 |
| 4. Foreign relief or reconstruction | 59 | 2 | 57 |
| 5. National movements in fields other than 1 and 2 | 18 | | 18 |
| 6. Campaigns to influence public opinion | 18 | | 18 |
| 7. Local churches and institutions | 124 | | 124 |
| 8. Personal aid (including loans, gifts, medical treatment, education) | 115 | | 115 |
| 9. Financing of books, plays, inventions, etc. | 39 | | 39 |
| 10. Investigation, reward, or purchase of alleged medical discoveries | 114 | | 114 |
| 11. Miscellaneous | 47 | 2 | 45 |
| TOTAL | 788 | 50 | 738 |

### Finances for 1920

Table 2 gives a summary of receipts and expenditures for the fiscal year 1920.

The income from invested funds was a little less than nine millions. A balance of four and a half millions was carried over from 1919, of which over three millions had been pledged. Likewise a balance of six millions has been carried forward into 1921, of which four and a half millions have been pledged. The table on pages 72 to 74 presents a complete list of expenditures

during 1920 for all purposes. A full statement from the Treasurer with all details as to investments, other property, income, and expenditures of the Foundation is contained in the regular annual report of the Rockefeller Foundation, which will be issued in the autumn.

TABLE 2: RECEIPTS AND DISBURSEMENTS IN 1920

| RECEIPTS | | EXPENDITURES | |
|---|---|---|---|
| Balance from 1919 (Including refunds on 1918 accounts) | $4,554,442 | Public Health.... | $2,095,572 |
| Income during 1920 | 8,727,730 | Medical Education | 4,482,964 |
| | | Miscellaneous ... | 286,842 |
| | | Administration ... | 212,478 |
| | | | $7,077,856 |
| | | Balance carried forward ($4,558,522 of which represented appropriations for 1920 and prior years not yet called for).... | 6,204,316 |
| | $13,282,172 | | $13,282,172 |

## Program for 1921

The work of the Foundation for any given year is projected in large part by its work for the immediately preceding period. Plans requiring for their development a period of years present new features of progress; adaptations are made to changing conditions; in general the work of the Foundation for 1921 will consist of continued demonstrations in the control of certain diseases and the promotion of training in medicine and

public health. Specific items of work which may be anticipated are as follows:

**Medical Education.** Formal opening in September of the Peking Union Medical College, constructed, staffed, and supported by the Foundation's China Medical Board.

Aid to medical school at Tsinan-fu and to certain pre-medical schools.

Appropriations to a number of foreign mission and native hospitals in China to increase their efficiency as centers for postgraduate experience, and as a means of familiarizing communities with modern medicine.

Conclusion of arrangement with the Free University of Brussels and the city of Brussels by which the Foundation will assume a share of the expense of rebuilding and reorganizing the University Medical School and City Hospital.

Payment to the University of London and the University College Hospital of $1,000,000 of the total of $5,000,000 pledged by the Foundation toward an enlargement of the plant and staff of a unified modern medical center in London.

A contribution of $1,000,000 to Columbia University toward rebuilding and reorganizing its medical school.

Payments to six medical schools in Canada of portions of contributions made to insure sub-

stantially increased building and educational facilities.

Continued provision of scientific literature to medical schools in European countries.

**Public Health Training.** Continued support of School of Hygiene and Public Health at Johns Hopkins University.

Consideration of means of increasing facilities in the United States for the training of public health officers.

Consideration of aid to the establishment of a public health institute by the Czechoslovakian Government at Prague.

Continued aid to the department of hygiene in the medical school of São Paulo University, Brazil.

**Fellowships.** Support of selected fellows from various countries for advanced study of public health and medicine.

Maintenance of a number of fellows who are engaged in advanced work and research under the auspices of a special committee of the National Research Council.

**Public Health Work.** Continuation and extension of campaigns against yellow fever, malaria, and hookworm disease.

The development of a public health laboratory service.

**Surveys and Research.** Aid to studies in the training of nurses in the United States and Europe, dispensary organization and service, and hospital administration.

Support of researches in hookworm disease.

Continuation of special studies under the auspices of the National Committee for Mental Hygiene, in the care and treatment of the insane and mentally deficient.

**Miscellaneous Items.** Contributions to a central office plan for certain public health agencies in New York, to a bibliographical center for biological literature at Zurich, to a library service bureau of the American Hospital Conference at Chicago, and to a few undertakings which now lie outside the scope of the Foundation, but were promised its support for a period of years.

These and similar plans which may be matured constitute the definite means by which the Foundation is seeking to further its purposes.

### The Commonwealth of Science

Science knows no national boundaries. It is a world product, a common fund of knowledge to which all nations contribute and upon which each may freely draw. To keep open the channels of communication by personal migration and by printed page, to encourage the training of specialists, to foster the growth of institutions,

to stimulate research, to encourage the application of scientific knowledge to the needs of nations, communities, and individuals, are tasks upon the successful performance of which largely depends the progress of the world in economic efficiency, physical health, and international good-will. It is the aim of the Rockefeller Foundation to have a part in this great movement by helping to increase the common store of knowledge about the causes of disease, and through demonstrations and the services of trained experts to diffuse this information as widely as possible among all peoples. Thus does the Foundation seek to fulfil its chartered purpose "to promote the well-being of mankind throughout the world."

# THE ROCKEFELLER FOUNDATION

## Report of the Secretary

To the President of the Rockefeller Foundation:

Sir:

I have the honor to submit herewith my report on the activities of the Rockefeller Foundation for the period January 1, 1920, to December 31, 1920.

Respectfully yours,

EDWIN R. EMBREE,

Secretary.

# SECRETARY'S REPORT

The review by the President outlines the policies by which the Rockefeller Foundation is being guided in its work, sketches its present program, and describes the results aimed at and accomplished during the year 1920. The following report depicts the organization and the agencies through which these results were reached, and outlines the methods by which the programs of the several departments were carried out.

## Organization

The following are the members and the principal officers of the Rockefeller Foundation:

MEMBERS

John G. Agar
Wallace Buttrick
Simon Flexner
Raymond B. Fosdick
Frederick T. Gates
A. Barton Hepburn
Harry Pratt Judson
John D. Rockefeller
John D. Rockefeller, Jr.
Wickliffe Rose
Julius Rosenwald
Martin A. Ryerson
Frederick Strauss
George E. Vincent

EXECUTIVE COMMITTEE

George E. Vincent, *Chairman*
Wallace Buttrick
Wickliffe Rose
Frederick Strauss
Edwin R. Embree, *Secretary*

OFFICERS

| | |
|---|---|
| John D. Rockefeller, Jr. | *Chairman of the Board of Trustees* |
| George E. Vincent | *President* |
| Edwin R. Embree | *Secretary* |
| Richard M. Pearce | *Director of the Division of Medical Education* |
| Charles C. Williamson | *Director of Information Service* |
| L. G. Myers | *Treasurer* |
| Robert H. Kirk | *Comptroller* |

The Foundation holds regular meetings in February, May, and December. The Executive Committee meets frequently during the intervals to execute programs within general policies approved by the Trustees.

## Departmental Boards

The Foundation accomplishes its work largely through its subsidiary or departmental organizations, which are devoted to special functions, and which depend upon the Foundation for funds. These with their officers and members are:

INTERNATIONAL HEALTH BOARD

George E. Vincent, *Chairman*

| | |
|---|---|
| Hermann M. Biggs | John D. Rockefeller, Jr. |
| Wallace Buttrick | Wickliffe Rose |
| Simon Flexner | Victor C. Vaughan |
| Frederick T. Gates | William H. Welch |
| Edwin O. Jordan | |

Edwin R. Embree, *Secretary*
Florence M. Read, *Assistant Secretary*

| | |
|---|---|
| Wickliffe Rose | *General Director* |
| John A. Ferrell, M.D. | *Director for the United States* |
| Victor G. Heiser, M.D. | *Director for the East* |
| H. H. Howard, M.D. | *Director for the West Indies* |
| F. F. Russell, M.D. | *Director of Public Health Laboratory Service* |

## Assistance to Other Agencies

In addition to the work carried out through the departmental organizations described above, the Rockefeller Foundation has contributed during the year to the accomplishment of work undertaken by other and unaffiliated organizations.

On pages 72 to 74 will be found a summary of payments made by the Rockefeller Foundation for all purposes during the year 1920. This tabular summary outlines, in terms of expenditures, the work described in terms of aims and results in the President's Review. In many instances these payments involved sums expended on account of appropriations made in former years. On the other hand, they represent in some instances but partial payments on many of the appropriations, made during 1920, which will provide for continuing work during succeeding years. For a full statement of the finances of the Foundation, see the Report of the Treasurer, pages 289 to 358.

## TABLE 3: EXPENDITURES OF THE ROCKEFELLER FOUNDATION FOR THE YEAR 1920

### I. PUBLIC HEALTH

| | | |
|---|---|---|
| A. International Health Board | | |
| 1. Hookworm, Malaria, and Yellow Fever Work | $965,155 | |
| 2. Tuberculosis in France | 522,459 | |
| 3. Fellowships and Public Health Education | 44,289 | |
| 4. Administration | 91,472 | |
| B. Studies and Demonstrations | | |
| 1. Mental Hygiene | 94,594 | |
| 2. National Organization for Public Health Nursing | 5,000 | |
| (Final payment on three-year pledge made in 1917) | | |
| 3. Committee for Survey of Conditions and Possible Coöperation in Care of Crippled Children in New York | 5,487 | |
| 4. Committee for the Study of Public Health Nursing Education | 22,293 | |
| 5. Hospital and Dispensary Studies and Service | 14,602 | |
| C. School of Hygiene and Public Health of Johns Hopkins University | 330,221 | |
| | | $2,095,572 |

### II. MEDICAL EDUCATION

| | | |
|---|---|---|
| A. China Medical Board | | |
| 1. Peking Union Medical College | | |
| (a) Land and Buildings | $2,772,186 | |
| (b) Operation | 483,060 | |
| 2. Other Medical and Pre-Medical Schools | 225,151 | |
| 3. Hospitals | 62,221 | |
| 4. Fellowships and Scholarships | 29,095 | |
| 5. Miscellaneous | 13,620 | |
| 6. Administration | 56,262 | |
| B. London Medical Center | 174,625 | |
| C. Canadian Medical Program | 518,750 | |
| D. Fondation Reine Elisabeth, Belgium | 80,972 | |
| E. Central Europe: Journals and Apparatus | 3,274 | |
| F. University of Chicago, Interest on Pledge | 40,463 | |
| G. Fellowships | 3,632 | |
| H. Studies in Medical Education | 19,653 | |
| | | $4,482,964 |

## III. MISCELLANEOUS

(Chiefly payments on previous pledges)

| | |
|---|---|
| A. American Academy in Rome ........... | $10,000 |
| (Payment on ten-year pledge made in 1914) | |
| *B. American Committee for Relief of Viennese Medical Scientists ............ | 10,000 |
| C. American Medical Association .......... | 9,793 |
| (Toward publishing Spanish edition of Journal) | |
| D. American University Union in Europe... | 15,000 |
| E. Committee of Reference and Counsel of Annual Foreign Missions Conference of North America .................. | 40,000 |
| (Payment on ten-year pledge made in 1914 for correlating educational work in foreign fields) | |
| F. Concilium Bibliographicum, Zurich, Switzerland .......................... | 7,532 |
| G. National Research Council ............. | 50,467 |
| (For Fellowships in Physics and Chemistry) | |
| H. National Information Bureau .......... | 1,000 |
| (For membership for the year 1919–1920) | |
| I. New York Association for Improving the Condition of the Poor ............ | 20,000 |
| (Payment on ten-year pledge made in 1914 for demonstration of social relief measures) | |
| J. Final payments on account of Work and Disposition of War Demonstration Hospital ........................ | 118,629 |
| K. Grand Chenier Bird Refuge—taxes and expenses ........................ | 4,421 |
| (Purchased in 1914 and supervised by Louisiana Department of Conservation) | |
| | $286,842 |

* Payments on an appropriation of $1,000,000 to the Child Feeding fund of the American Relief Administration were not made until after the close of the year and hence do not appear in this summary.

IV. ADMINISTRATION

| | | |
|---|---|---|
| A. Maintenance of Executive Offices and Treasurer's Office | $173,063 | |
| B. Reports and Publications | 32,029 | |
| C. Books and Furniture | 7,386 | |
| | | $212,478 |
| | | $7,077,856 |

## Funds and Property

As of December 31, 1920

PRINCIPAL FUNDS

| | | |
|---|---|---|
| General Fund | | $171,204,624 |
| Reserve | | 3,111,288 |
| Special Funds: | | |
| Gifts of John D. Rockefeller | $37,000 | |
| Gifts of Laura S. Rockefeller | 49,300 | |
| Henry Sturgis Grew Memorial Fund | 25,000 | |
| Arthur Theodore Lyman Endowment | 5,500 | 116,800 |
| | | $174,432,712 |

LANDS, BUILDINGS, AND EQUIPMENT

| | |
|---|---|
| In China: Medical School Lands, Buildings, and Equipment | $7,528,505 |
| In New York: Furniture and Equipment of Offices | 24,331 |
| | $7,552,836 |

UNDISBURSED INCOME

| | | |
|---|---|---|
| General Income (of which $4,558,521.98 represented appropriations payable in 1920 and prior years, but which had not been called for) | | $6,204,316 |
| Special Income Accounts: | | |
| Estate Laura S. Rockefeller | $28,754 | |
| Henry Sturgis Grew Memorial | 2,984 | |
| Arthur Theodore Lyman Endowment | 466 | 32,204 |
| | | $6,236,520 |

# INTERNATIONAL HEALTH BOARD

## Report of the General Director

## INTERNATIONAL HEALTH BOARD

### Report of the General Director

To the President of the Rockefeller Foundation:

Sir:

I have the honor to submit herewith my report as General Director of the International Health Board for the period January 1, 1920, to December 31, 1920.

Respectfully yours,

WICKLIFFE ROSE,
General Director.

# INTERNATIONAL HEALTH BOARD

## OFFICERS AND MEMBERS

GEORGE E. VINCENT, *Chairman*
WICKLIFFE ROSE, *General Director*
HERMANN M. BIGGS
WALLACE BUTTRICK
SIMON FLEXNER
FREDERICK T. GATES
WILLIAM C. GORGAS[1]
EDWIN O. JORDAN
STARR J. MURPHY[2]
JOHN D. ROCKEFELLER, JR.
WILLIAM T. SEDGWICK[3]
VICTOR C. VAUGHAN
WILLIAM H. WELCH

---

EDWIN R. EMBREE, *Secretary*

[1] Deceased July 4, 1920.
[2] Deceased April 4, 1921.
[3] Deceased January 25, 1921.

# PERSONNEL OF STAFFS DURING 1920[1]

## ADMINISTRATIVE STAFF

WICKLIFFE ROSE, *General Director*

JOHN A. FERRELL, M.D., *Director for the United States*

VICTOR G. HEISER, M.D., *Director for the East*

HECTOR H. HOWARD, M.D., *Director for the West Indies*

L. W. HACKETT, M.D., *Associate Regional Director (for Brazil)*

ERNST C. MEYER, *Director of Surveys and Exhibits*

F. F. RUSSELL, M.D., *Director of Public Health Laboratory Service*

## FIELD STAFF

### HOOKWORM

| | |
|---|---|
| AUSTRALIA | W. A. Sawyer<br>S. M. Lambert[2] |
| BRAZIL | L. W. Hackett<br>J. L. Hydrick |
| Bahia | F. L. Soper |
| Maranhão | F. L. Soper |
| Minas Geraes | G. K. Strode |
| Pernambuco | F. L. Soper |
| Rio Grande do Sul | Alan Gregg |
| Santa Catharina | Alan Gregg |
| CEYLON | W. P. Jacocks<br>S. A. Winsor[2]<br>C. H. Yeager<br>G. G. Hampton |
| COLOMBIA | F. A. Miller |

[1] Personnel employed by Government in co-operative work not listed.
[2] Special Staff Member.

| | |
|---|---|
| Costa Rica | Louis Schapiro<br>J. E. Elmendorf, Jr. |
| Guatemala | E. I. Vaughn[1] |
| India (Madras Presidency; survey) | G. P. Paul |
| Jamaica | P. B. Gardner (resigned)<br>B. E. Washburn<br>J. W. Visher (resigned) |
| Mauritius (survey) | J. F. Kendrick |
| Nicaragua | D. M. Molloy |
| Panama | F. A. Miller (transferred to Colombia)<br>F. C. Caldwell |
| Porto Rico (survey) | J. B. Grant |
| St. Lucia | R. B. Hill (acting) |
| Salvador | C. A. Bailey |
| Santo Domingo (survey) | J. B. Grant |
| Seychelles | J. F. Kendrick |
| Siam | M. E. Barnes |
| Trinidad | G. C. Payne<br>R. B. Hill<br>W. C. Hausheer |

## COUNTY HEALTH WORK IN UNITED STATES

| | |
|---|---|
| Alabama | F. W. Dershimer<br>A. L. McKay |
| Kansas | A. J. Warren |
| Kentucky | P. W. Covington |

[1]Special Staff Member.

| | |
|---|---|
| New Mexico | D. B. Wilson<br>F. H. Busby (resigned) |
| North Carolina | J. F. Docherty |

## MALARIA

| | |
|---|---|
| Alabama | E. B. Johnson[1] |
| Arkansas | L. G. Hastings[1]<br>William Ropes[1] |
| Louisiana | H. A. Taylor<br>F. P. Gilbert[1]<br>H. W. Green[1]<br>F. E. Hulse[1]<br>J. J. Mieldazis[1]<br>L. J. Petritz |
| Mississippi | H. H. Howard<br>C. C. Bass[1]<br>J. L. Clarke[1] |
| Nicaragua | F. E. Hulse[1]<br>D. M. Molloy |
| North Carolina | C. E. Buck[1] |
| Porto Rico | H. W. Green[1] |
| South Carolina | C. E. Buck[1] |
| Texas | E. H. Magoon[1]<br>George Parker[1] |
| Virginia | E. H. Gage[1] |

## YELLOW FEVER

Yellow Fever Advisory Council[2]

Henry R. Carter, M.D., Assistant Surgeon General, United States Public Health Service

---

[1] Special Staff Member.
[2] Not staff members; appointed to serve in an advisory capacity.

Juan Guiteras, M.D., Director of Public Health, Cuba
Joseph H. White, M.D., Assistant Surgeon General, United States Public Health Service
Hideyo Noguchi, M.D., Rockefeller Institute for Medical Research

Yellow Fever Commission to the West Coast of Africa

W. C. Gorgas,[1] *Chairman* (deceased)
R. E. Noble, Assistant Surgeon General, U. S. A.
Juan Guiteras, Director of Public Health, Cuba
Adrian Stokes, Assistant to Professor of Pathology, Trinity College, Dublin
A. E. Horn, West African Medical Service
W. F. Tytler, Member of Staff of Medical Research Council, London

| | |
|---|---|
| Mexico and Central America | T. C. Lyster |
| Ecuador | M. E. Connor |
| Guatemala | E. I. Vaughn[1]<br>H. K. Marshall[1] |
| Mexico | M. E. Connor<br>B. W. Caldwell[1]<br>I. J. Kligler<br>Hideyo Noguchi |
| Nicaragua | D. M. Molloy |
| Salvador | C. A. Bailey<br>W. H. Davies[1] |

## TUBERCULOSIS

Tuberculosis in France

L. R. Williams,[1] *Director*
B. L. Wyatt[1]
S. M. Gunn[1]
Alexandre Bruno[1]
F. Elisabeth Crowell[1]

[1] Special Staff Member.

## SPECIAL

School of Hygiene and Public Health, São Paulo

S. T. Darling,[1] *Professor of Hygiene and Director of Laboratory*
W. G. Smillie, *Assistant Professor of Hygiene*
G. H. de Paulo Souza[1]
F. Borges Vieira[1]

Public Health Administration, Czechoslovakia

S. M. Gunn[1]

## ON LEAVE

W. T. Burres
S. T. Darling[1]

## AT HOME OFFICE

C. W. Wells (in charge of fellowships)

## IN TRAINING

| | |
|---|---|
| Alabama | A. L. McKay |
| Arkansas | William Ropes[1] |
| Costa Rica | J. E. Elmendorf, Jr. |
| Louisiana | F. E. Hulse[1]<br>L. J. Petritz |
| Mississippi and Ceylon | G. G. Hampton |
| Mississippi and Trinidad | W. C. Hausheer |
| New Mexico | F. H. Busby (resigned) |
| North Carolina | J. F. Docherty |
| North Carolina and New Mexico | D. B. Wilson |

[1] Special Staff Member.

## OPERATIONS IN BRIEF

In the development of medicine emphasis is shifting from cure to prevention. Despite the fact of world-wide financial depression the year has been one of encouraging progress in public health. Government appropriations have been increased. New services involving continuing expenditures have been created and men are being trained for their administration. In response to the appeal of opportunities far in excess of its resources the Board has shared in an increasing number of projects in something more than fifty states and countries throughout the world.

### Promoting Health in Many Lands

The Board brought its tuberculosis work in France well within sight of the completion of its transfer to the French by the end of 1922; took up the fight against yellow fever in Mexico; continued it in Guatemala, Honduras, Nicaragua, and Salvador; brought to successful conclusion the effort to free Guayaquil and Ecuador of the infection, and sent a yellow fever commission to West Africa to make a preliminary study of the situation; joined forces with federal, state, and local authorities in a series of demonstrations in

malaria control by anti-mosquito measures in ten southern states; made a study of conditions in Argentina, Porto Rico, and Nicaragua with a view to extending its work in malaria control to tropical regions; pushed the fight against hookworm disease as a means of creating popular interest in public health under forty-two governments distributed over the more heavily infected regions; carried out a series of scientific studies yielding significant results in the fields of hookworm disease and malaria control; aided in the development of a rural county health service in twelve states; co-operated with the new ministry in developing public health administration in Czechoslovakia; assisted four state and national departments of health in establishing or further developing their public health laboratory service; and contributed toward the development of schools of hygiene at Prague and at São Paulo, Brazil, aided state boards of health in maintaining intensive short courses for workers in the service, and provided fellowships in public health for thirty-four selected students from ten countries. The object and effect of the effort in all countries have been to create popular sentiment in support of public health, to increase appropriations for health purposes, and to promote the development of permanent agencies for the control of disease, the cultivation of

hygiene as a science, and the training of men for public health service.

### Fighting Yellow Fever

Yellow fever, ignoring as it does political boundary lines and disturbing directly or indirectly the commerce of all nations, presents a particularly strong appeal for concerted effort on an international scale. During the year 1920 operations against the disease were in progress in all infected areas: on the east coast of Brazil; in Ecuador and Peru; in Guatemala, Honduras, Nicaragua, and Salvador; in Mexico; and in West Africa.

**In Brazil.** The infected area in Brazil is being steadily reduced. Extending in former


Fig. 11.—Result of twenty years' war on yellow fever. Few endemic or epidemic centers remain in the Western Hemisphere

years from Rio de Janeiro along the east coast to the mouth of the Amazon river and up the Amazon valley to Iquitos in Peru, the disease is now confined to a narrow coastal strip from Pernambuco to Bahia. These two ports are suspected as endemic foci from which the infection spreads from time to time to the surrounding regions. A number of sporadic outbreaks early in the year were promptly extinguished. The situation would seem to call for an organized attack on the breeding places of the Stegomyia mosquito throughout the danger zone, with special concentration of effort on the two strategic centers: Pernambuco and Bahia. Operations are under the Brazilian National Department of Health, which has made available ample funds for the purpose.

**In Ecuador.** Yellow fever quarantine against Guayaquil, for more than seventy-five years a dreaded seed-bed of infection, has been lifted. Control measures were inaugurated in November, 1918. Effort was centered on the breeding places of the Stegomyia. As the mosquito index was lowered the case rate fell rapidly from eighty-eight in December, 1918, to two in May, 1919, since which time no case has been reported from Guayaquil or Ecuador. After more than a year of continued mosquito control dating from the last reported case of yellow fever, Gov-

Fig. 12.—The late Major General William Crawford Gorgas. At the time of his death General Gorgas was Director of the Yellow Fever Commission of the International Health Board

# A TRIBUTE TO GENERAL GORGAS

By William H. Welch, M.D.

The following minute from the pen of Dr. William H. Welch was incorporated in the records of the International Health Board at its meeting on May 24, 1921:

Major General William Crawford Gorgas, a member of the International Health Board and the Director of its Yellow Fever Commission, died in London July 4, 1920, while on his way to the west coast of Africa to investigate the prevalence and importance of yellow fever in that region.

General Gorgas, by the conquest of yellow fever in Havana and the control of this and other pestilential diseases on the isthmus of Panama, had won world-wide recognition as a sanitary administrator. American and European countries alike sought his advice and services for the control of endemic and epidemic diseases. One of the most important of his foreign missions was to the Transvaal, where the measures he recommended resulted in markedly reducing the high mortality rate of pneumonia.

In January, 1914, General Gorgas became Surgeon General of the United States Army, and in 1915, in recognition of his work in sanitating the Canal Zone, he was created Major General by special act of Congress. Throughout the period of the World War he served as Surgeon General of the United States Army. The confidence reposed in him by the army, the medical profession, and the general public did much to enhance the value of his services in protecting the health of the American troops.

Years before his death his investigations and experiences with yellow fever had convinced him that in the Western Hemisphere the disease was kept alive by its prevalence in a few endemic foci. By means of a successful attack on the disease in these foci he considered it feasible to eliminate the infection from the New World. The stamping out of the disease in Guayaquil, and the encouraging prospect of controlling the infection in other parts of South America and in Central America, fully justify this faith of General Gorgas.

It is not too much to state that the results accomplished through the administrative genius of Gorgas, coupled with the scientific discoveries of others—notably those of Walter Reed and his colleagues on the United States Army Yellow Fever Commission—have repaid many times over all the money that has been expended for the support of scientific research. Their work has resulted in saving untold thousands of human lives and much treasure, in protecting the American sea-coasts from the invasion of a dreadful scourge, in the construction of the Isthmian Canal through a pestilential zone transformed into one of the most healthful on the globe, and in reclaiming for civilization many pest-ridden regions in tropical countries throughout the world.

The genial, kindly qualities of General Gorgas endeared him to all his associates. To his colleagues on the Board the memory of him and of his achievements will always remain a cherished inspiration.

ernment declared the country free of infection and on December 1 the Board's representative was withdrawn. The local authorities are continuing operations as a precaution against the re-introduction of infection from Peru.

**In Peru.** Early in the year 1919 an extensive epidemic of yellow fever broke out in the department of Piura, just across the Ecuadorian border in northern Peru, and in twelve months had spread unchecked over a considerable area. The epidemic numbered more than 3,000 cases, with from 500 to 600 deaths. Mosquito control undertaken by Government in 1920 and carried out under the direction of Dr. Henry R. Carter, of the United States Public Health Service, resulted in the epidemic being promptly suppressed. Dr. Noguchi, of the Rockefeller Institute for Medical Research, visited the region during the outbreak and further confirmed his earlier findings in Guayaquil and Mexico by isolating from the blood of yellow fever patients the *Leptospira icteroides*.

Before the infection had been stamped out in Piura it had been carried into the department of Lambayeque to the south and was not discovered until it had again spread over a considerable region. Late reports indicate that it is still making headway. In response to invitation by Government the Board has contributed toward

the maintenance of control measures which are now being organized by Dr. Henry Hanson under the National Department of Health.

**In Mexico and Central America.** Merida, Yucatan, has been regarded for years as an important endemic focus of yellow fever. Authorities have been disposed to refer to it as the seedbed from which the infection has been carried from time to time throughout Mexico and Central America. From some source outbreaks have occurred during the last two years in eastern and western Mexico, Guatemala, Honduras, Nicaragua, and Salvador. Operations covering this entire region are now being carried out under unified administration. In each of these countries Government has created under its national department of health a yellow fever commission. By executive decree these commissions have been given full authority to deal with the situation. The simple device of giving the Board representation on each of the commissions has effected concert of effort. Recent reports indicate a steadily falling mosquito index and a corresponding drop in case reports. In view of the vast extent of the area to be covered effort is being centered on strategic points, and particularly on Merida as the key to the situation.

**Commission to Africa**

The objects of the commission to West Africa were two: (1) to determine whether the reported yellow fever in that region is yellow fever; and (2) to ascertain, if the presence of yellow fever should be confirmed, whether control measures were feasible. The commission sailed from London June 30; visited the Belgian Congo, Dahomey, Gold Coast, Northern Nigeria, Senegal, Sierra Leone, and Southern Nigeria; and submitted its report in New York December 2. No authentic case of yellow fever was seen. Conferences and a study of records, however, gave strong indication of the presence of the infection within recent years. The region of suspected infection is vast, travel is difficult, and living conditions are extremely primitive. And to these must be added the deeply rooted native tradition to conceal all cases of sickness. The control of yellow fever, however, even under these trying conditions, is regarded as not altogether impracticable. The commission recommends that the report be accepted merely as a progress report and that another commission be sent out, equipped for a more extensive and prolonged investigation of the situation, including a laboratory study of the suspected fevers of the region.

### Yellow Fever Vaccine and Serum

Killed cultures of *Leptospira icteroides* were first prepared and used by Noguchi for protective inoculation against yellow fever in Guayaquil in 1918, with suggestive results. The vaccine has been used on a considerable scale in Mexico and Central America with results which seem to support the earlier indications. A therapeutic serum prepared by Noguchi is also available for the treatment of yellow fever. The use of this serum given in the early days of the disease in a limited number of cases seemed to reduce the usual yellow fever mortality of 50 to 60 per cent to 9 per cent. These products are being supplied to government authorities in Mexico, the Central American countries, Peru, and Brazil. It is to be borne in mind, nevertheless, that the vaccine, however valuable as a protection to the individual, is *not* a substitute for thoroughgoing mosquito control.

### Crusade Against Tuberculosis in France

In 1917 the Board joined forces with Government and the people of France in a national crusade against tuberculosis. For three years the French had borne the brunt of war; the tuberculosis rate was supposed to be high and to be on

Fig. 13.—History taking in clinic work. Campaign against tuberculosis. France

Fig. 14.—Traveling unit used by Educational Division, Commission for Prevention of Tuberculosis in France

the increase; there were in the country but twenty-two tuberculosis dispensaries, and for tubercular cases, military and civilian, not more than 8,000 beds. The situation as viewed by the authorities called for energetic measures.

After conference with French officials and a study of the situation on the ground, operations were organized under a Commission for the Prevention of Tuberculosis in France. The Commission, working at all times in co-operation with the French and with steadily increasing French personnel, undertook to encourage the establishment of tuberculosis dispensaries; to develop centers for the training of visiting nurses; to provide graduate instruction for physicians to prepare them for medical service in connection with the dispensaries; to conduct an energetic educational campaign on a national scale; and to focus all activities in two concrete demonstrations—one comprising a typical congested city arrondissement in Paris, the other the rural de-

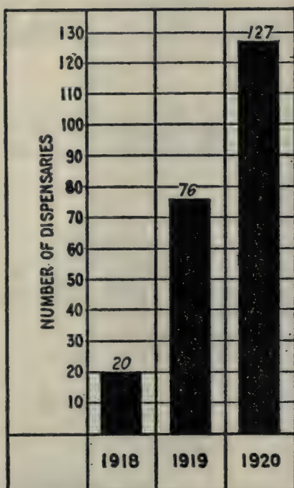



Fig. 15.—Tuberculosis dispensaries functioning in France through initiative of Bureau of Departmental Organization, 1918–1920

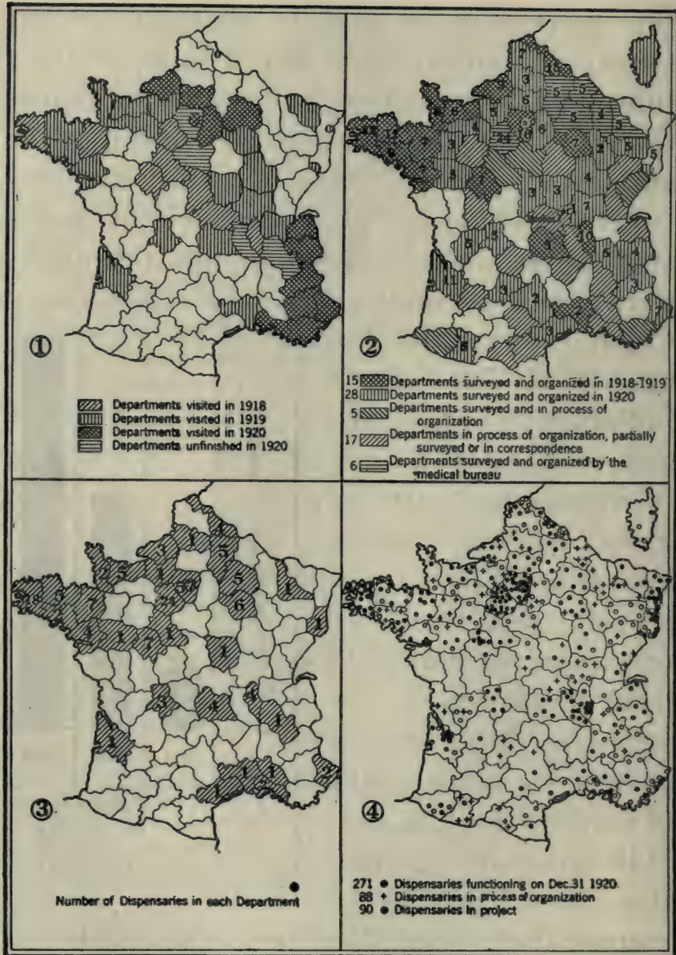



Fig. 16.—Organization and activities of Commission for the Prevention of Tuberculosis in France. 1. Work of educational division, showing departments visited by travelling exhibits during 1918, 1919, and 1920; 2. Work of division of departmental organization, showing departments in which anti-tuberculosis organization has been effected or is in progress; 3. Number of tuberculosis dispensaries in each department co-operating with the Commission on December 31, 1920; 4. Total number of tuberculosis dispensaries functioning, in process of organization, or in project at the end of 1920

partment of Eure-et-Loir. Mobile educational exhibits have covered systematically twenty-eight departments; departmental organization, including dispensaries and provision of hospital beds, has been completed in twenty-one departments; seven centers are in operation for the training of public health visitors, and plans have been matured for the establishment of three—possibly four—permanent training schools; diplomas have been granted to 215 women completing the course. The short courses for physicians have been successful beyond expectations. A sustaining popular sentiment has been created, and Government agencies, national and local, are committed to the task. The National Committee of Defense against Tuberculosis has been organized for the ultimate direction of the work. Present plans provide for completion of the transfer of responsibility to French agencies by the end of 1922.

### Team-Play in Malaria Control

A series of field experiments conducted in a group of small towns in southwestern Arkansas during the years 1916-1919 had yielded encouraging results. Similar measures had been applied by the Federal Government in the cantonment zones and a number of small communities in

many parts of the South. It had been shown that in towns—even small towns of 1,000 to 1,500 inhabitants—under average conditions in the Southern States, malaria can be controlled within limits of cost which such communities may well afford. Conditions seemed to invite a joint undertaking on a larger scale with a view to driving this fact home to the people throughout the more heavily infected region. Early in the year 1920 the United States Public Health Service, the state departments of health, and the Board entered into an arrangement by which demonstrations in malaria control were carried out in fifty-two towns in ten Southern States. The local communities provided a liberal share of maintenance costs. Effort was centered on the breeding places of mosquitoes. The measures employed were simple drainage, filling borrow pits and shallow pools, channeling streams, clear-

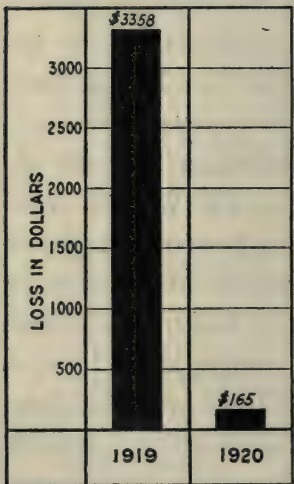



Fig. 17.—Results of malaria work measured in terms of dollars. Comparison of losses due to doctors' bills, medicine, and wages sustained by one Tennessee town during 1919 and 1920, respectively. Eighty-seven families reported cases of malaria in 1919; only sixteen in 1920. Anti-mosquito measures conducted during 1920 cost the town a total of only $1,847.75.

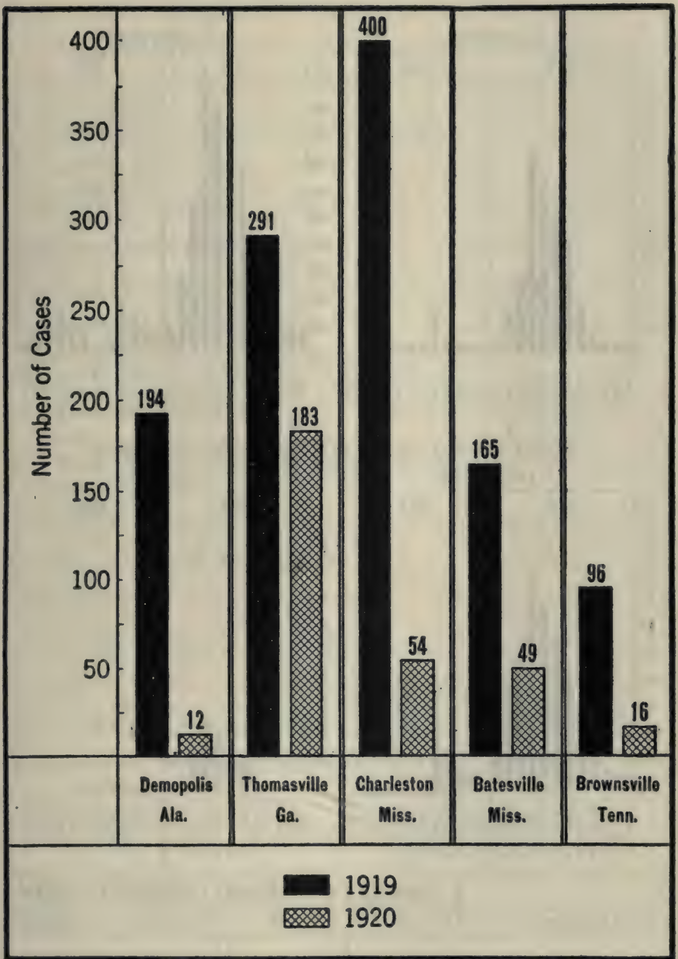
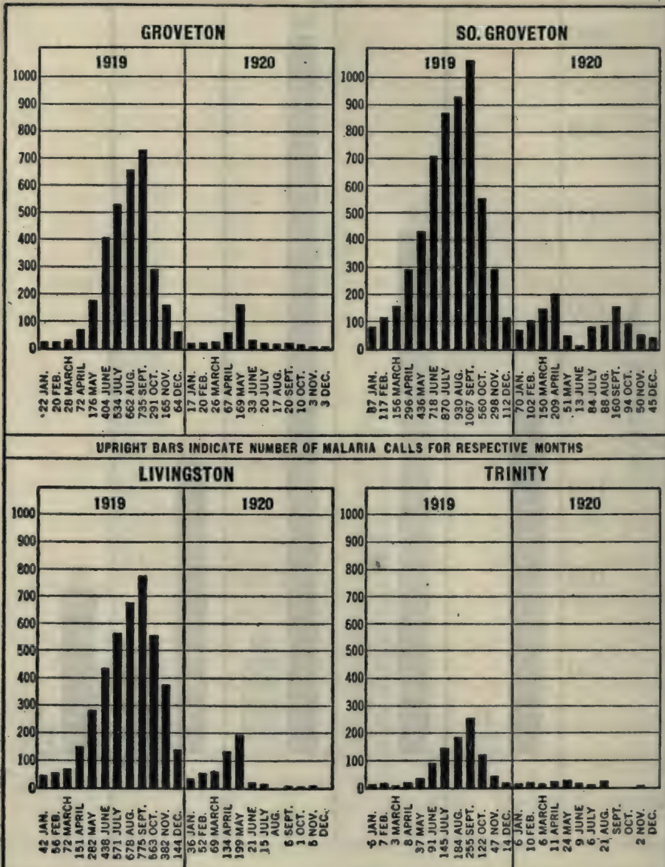



Fig. 18.—Reduction in cases of malaria in five Southern towns where anti-mosquito operations were conducted in 1920 (figures based on physicians' cases). Work was conducted in fifty-two towns, but comparative records of malaria incidence for 1919 and 1920 are not available for all. (See also Fig. 19.)




| | | GROVETON | SO. GROVETON | LIVINGSTON | TRINITY |
|---|---|---|---|---|---|
| POPULATION | | 1200 | 1300 | 1250 | 1250 |
| Calls for Malaria | 1919 | 3173 | 5647 | 4154 | 919 |
| | 1920 | 405 | 1116 | 538 | 95 |
| Per Capita Cost | 1920 | .27 | .23 | .23 | .35 |

Fig. 19.—Malaria control by anti-mosquito measures in four Texas towns (based on physicians' calls for 1919 and 1920). Control effort began April 1, 1920. (See also Fig. 18.)

ing the margins of streams and ponds, removing obstructions, turning in the sunlight, oiling, and enlisting the services of the top minnow. Typical results are exhibited in Figs. 18 and 19. The average per capita cost for the fifty-two towns was 78¢ per annum. The records show that such communities having a reasonably heavy infection may free themselves of malaria and of the mosquito as a pest for less than malaria is costing in doctors' bills alone.

### Mosquito Control in a Rural Community

Malaria, however, is a rural disease also. In most infected regions it bears with greatest severity upon the people who cultivate the soil. In 1918 the Board undertook a three-year experiment to test the feasibility of mosquito control in a typical community of scattered farm homes. The area selected was in Hinds county, Mississippi. After one year devoted to a study of the field, a systematic attack was made on the breeding places within one fourth mile of each home. Oil and the top minnow were the principal weapons employed. The results were a further demonstration of the efficiency of the top minnow and a reduction of 77 per cent in malaria incidence at a per capita cost of $2.60 for 1919 and of $3.09 for 1920.

## Fighting Mosquitoes With Fish

The outstanding feature of the experiment in Hinds county was the use of the top minnow (*Gambusia affinis*) as principal agent in the control of Anopheles breeding. The fish were procured from a large pond within the community; they were easily transported, multiplied rapidly, wintered well, and were tremendously effective in devouring mosquito eggs and larvae. Wherever conditions favored their use, they demonstrated important advantages over oil: the original cost represented only the slight labor of transportation; they were relatively permanent, only a few places requiring occasional re-stocking; they were unaffected by rain or wind; and were effective in many breeding places, as in stock ponds and certain running-streams, where oil could not be applied. In 89 per cent of the water deposits within the area in 1919, and in 85 per cent in

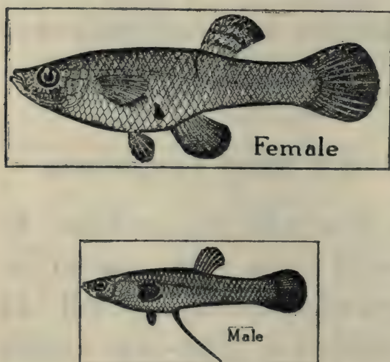



Fig. 20.—Top minnows (*Gambusia affinis*); actual size. These fish reduce the incidence of malaria in control areas by devouring mosquito larvae, which are their favored food

Fig. 21.—Type of ditch to carry off drain water and prevent mosquito breeding. Malaria control operations, Southern States

Fig. 22.—Ditching gang at work. Malaria control by anti-mosquito measures, Southern States

1920, mosquito breeding was kept under complete control by the use of the top minnow alone.

Fish were enlisted in 1920 in the fight against malaria in towns. At Canton, Mississippi, the top minnow effected complete control in 86 per cent of the breeding places; at Athens, Texas, 70 per cent reduction in malaria incidence was achieved through the use of fish alone. Dr. Connor used fish as an important agent in freeing Guayaquil of yellow fever; Le Prince of the United States Public Health Service, demonstrated their effectiveness in Tampico; and they are now being enlisted in the war on yellow fever throughout the infected region in Mexico, Central America, and Peru.

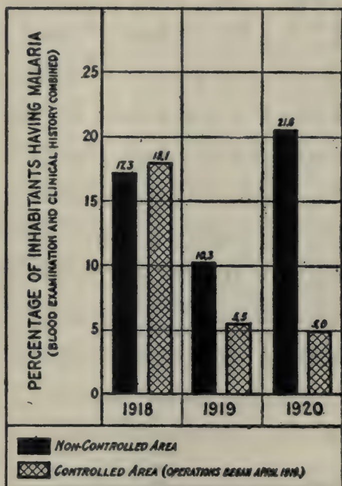



Fig. 23.—Malaria control by anti-mosquito measures, Hinds county, Mississippi, 1919 and 1920. Rate of clinical malaria in controlled area compared with that in non-controlled area. (Note decline of malarial incidence in controlled area despite fluctuation in non-controlled area)

## Malaria Control by the Use of Quinine

Theoretically it should be possible to prevent the spread of malaria by an attack on the para-

site in the blood of the human host. Every mosquito that carries malaria has derived its infection from the blood of an infected person. If the blood of all infected persons in a community were freed of the parasite, malaria should disappear. By field experiment on a large scale Dr. C. C. Bass has shown that in the Mississippi delta, ten grains of quinine a day for eight weeks kills the parasites in the blood of about 90 per cent of the cases treated. Effort has been made to apply the principle in a selected area in Sunflower county. In 1918 the area, comprising 100 square miles and 9,000 inhabitants, was worked intensively by house-to-house visit. All persons shown by blood examination to be infected, and those giving a history of an attack of malaria within twelve months, were given the standard treatment. Quinine was furnished free. During 1919 and 1920 the drug was provided in convenient form at cost. To plantation managers, physicians, and the people living within the area, reduction in malaria incidence has been obvious. It has been difficult, however, to get a definite statistical measurement of results. By the best estimate available the malaria incidence has been lowered from 40 per cent in 1917 to 18 per cent in 1920. The per capita cost has been: for 1918, $1.08; for 1919, $1.09; and for 1920, $0.38.

The treatment employed by Bass in this field experiment has been endorsed by the United States Public Health Service and the National Malaria Committee, and is being adopted by physicians in their practice. Arrangements have recently been made whereby a commercial agency will supply quinine put up in standard treatment form to stores throughout all malarious communities of the Southern States where the sale of the drug is encouraged by state and local health authorities. This arrangement, by enabling persons desiring quinine treatment to secure it at stores for about half the usual price, will make it unnecessary for health agencies to provide funds for quinine distribution.

### Promoting Public Health Through Hookworm Control

Hookworm is one of the most serious of the disabling diseases of man. It is not for this reason, however, that the Board has selected it for so large a share in its scheme of operations. Its control, easily justifiable on its own account, is much more important as a means to a larger end. The disease lends itself readily to purposes of demonstration. It affects fundamentally the welfare of mankind over vast regions, and yet in its cause, its cure, its mode of transmission and means of prevention, it is so

simple and tangible that the layman—even the illiterate—may be made to see and understand it. Demonstrations in the control of this one disease, while bringing relief to hundreds of thousands of suffering people and increasing the economic efficiency of communities and countries, are having a more important effect in creating a popular interest in public health and in promoting the development of permanent agencies for the control of this and other preventable diseases.

With this object in view, control operations were continued or undertaken during the year in nine Southern States and twenty-five foreign states and countries;[1] and infection surveys were carried out in whole or in part in Madras presidency, India; in the islands of Porto Rico, Santo Domingo, and Mauritius; in Colombia; in limited areas of South Australia, Victoria, Tasmania, Northern Territory, New South Wales, and Queensland, Australia; and in the states of Bahia, Pernambuco, Maranhão, Santa Catharina, and Rio Grande do Sul, Brazil.

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[1] **Southern States:** Alabama, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia; **West Indies:** Jamaica, Porto Rico, St. Lucia, and Trinidad; **Central America:** Costa Rica, Guatemala, Nicaragua, Panama, and Salvador; **South America:** the Federal District and the states of Bahia, Maranhão, Minas Geraes, Paraná, Pernambuco, Rio de Janeiro, Rio Grande do Sul, São Paulo, and Santa Catharina in Brazil; and Colombia; **The East:** Ceylon, Papua, Queensland, Seychelles, and Siam.

**Nearing the Goal in the Southern States**

Operations in the Southern States for the past ten years illustrate the principle above set forth. In 1910-1911 the Rockefeller Sanitary Commission entered into joint arrangement with eleven states for the relief and control of hookworm disease. Five years later the unfinished labors of the Commission were taken over by the International Health Board and have been continued to the present. The time has now arrived when one may say the object which the Commission had in mind has been accomplished, and the arrangement, so far as this disease is concerned, may be brought to a satisfactory close.

These states have not been freed of hookworm. Far from it. The accomplishment of that result, it was understood and stated in the beginning, is a thing that no outside commission could do if it would and that no such organization should do if it could. This is a work for permanent agencies operating over long periods of time. Nevertheless, the object which the Commission set out to accomplish has been achieved. The disease has been greatly reduced in both severity and prevalence; the people have been enlightened as to its importance, its relief, and the means of its final control; permanent agencies rooted in the soil are committed to the task; and

a sustaining public sentiment has been created in the interest of more general measures for the better protection of health. Legislative appropriations for public health purposes have increased during the ten years more than 500 per

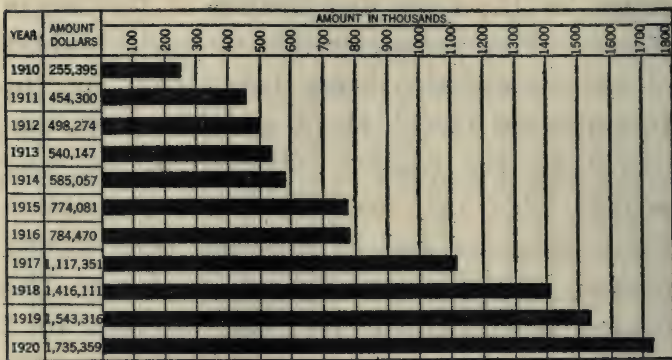


Fig. 24.—Appropriations of legislatures to State Boards of Health in eleven Southern States. 1910–1920. Funds for anti-tuberculosis work included

cent. Full-time county organization is being rapidly developed and measures against hookworm are being absorbed in more general schemes of disease control. In short, the foundation has been laid in these states for a tax-supported health service, state and local, which may be depended upon in the end for the control of hookworm and other preventable diseases.

Comradeship with the states in this service has been an inspiring privilege. Withdrawal from participation in measures directed specifically against this one disease does not terminate or

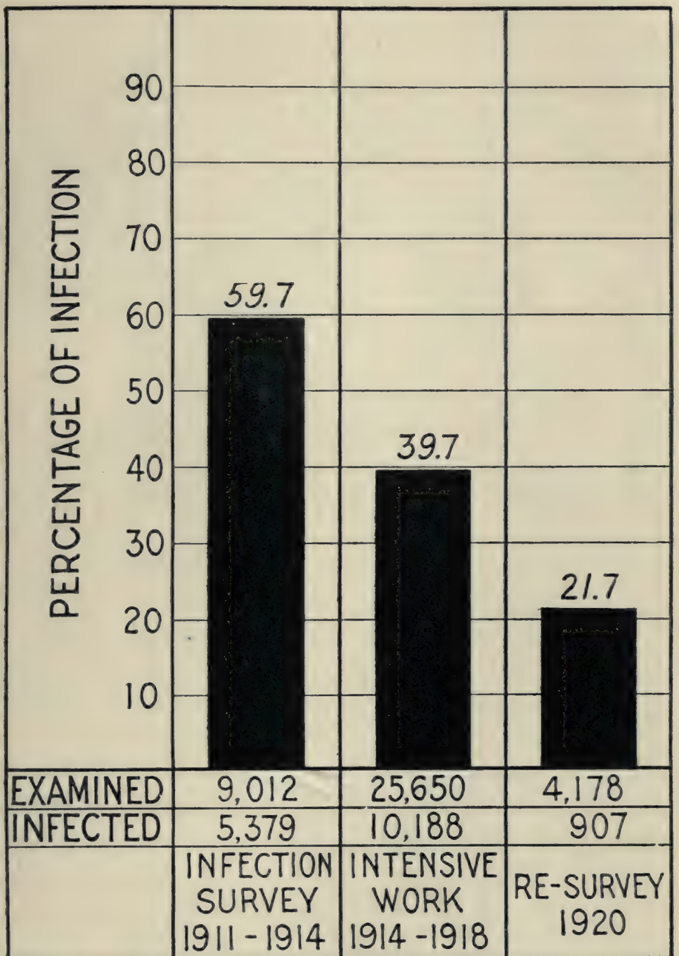


Fig. 25.—Decline in hookworm incidence among school children in Southern States during ten-year period, 1911 to 1920. Based on examination of 38,840 cases in twelve counties

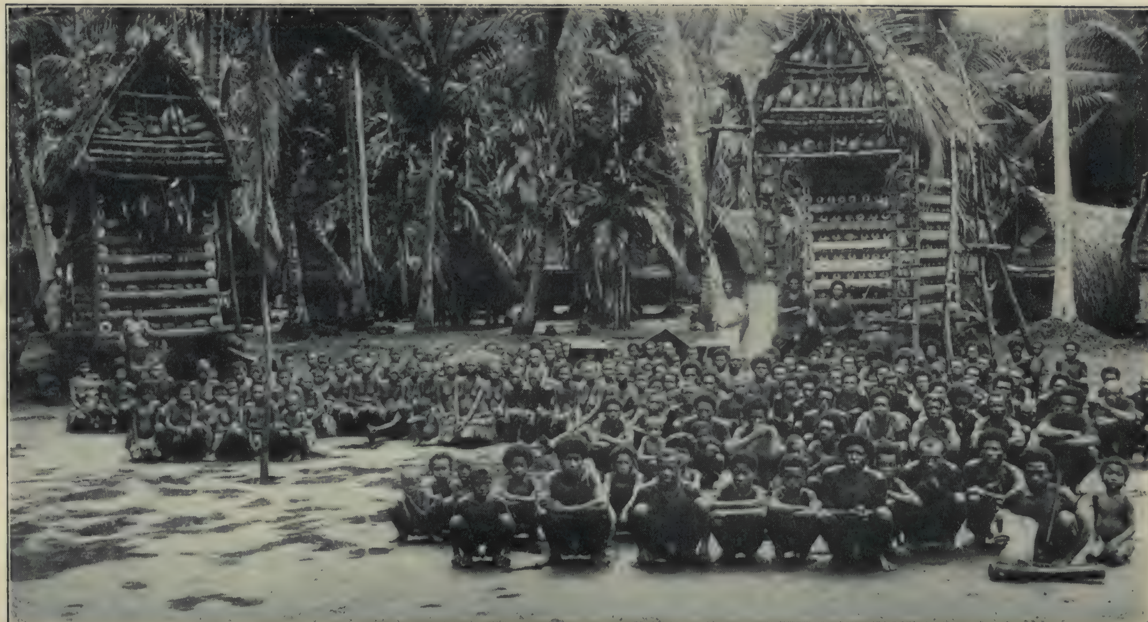

Fig. 26.—Carrying the gospel of sanitation to native peoples. Attendance at lecture on hookworm disease. Village of Gamilababa, Trobriand Islands, Papua

disturb this relationship. It makes possible rather the transfer of effort to what have come to be the more strategic points in the general scheme of development. These are for the present malaria control, the county health service, and the training of personnel for the services that are being created.

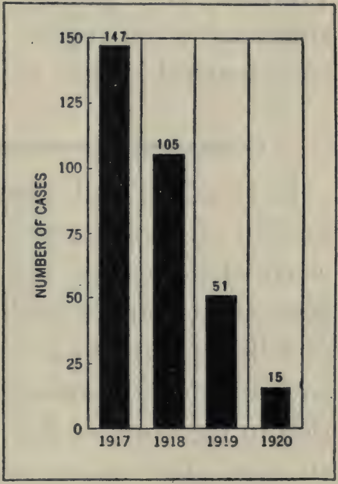


Fig. 27.—Decline in cases of typhoid fever, Monroe county, Mississippi, 1917 to 1920. Measures against typhoid fever constitute an important feature of county health work

**Resuming Operations in the West Indies**

During the war it became necessary on account of shortage in personnel to discontinue active measures against hookworm in three colonies of this group. Operations are now in progress in Trinidad, St. Lucia, Jamaica, and Porto Rico, with preparations under way for re-opening the work in Dutch Guiana, British Guiana, and Grenada. In all these countries government has undertaken to establish and maintain a system of soil sanitation well in advance of the mobile clinics which follow with an organized scheme of in-

tensive treatment and education. The outstanding features of recent development have been a slow but steady growth in Government support; conspicuous advance, particularly in Trinidad and Jamaica, in sanitation; and an appreciable movement in the direction of a more general scheme of public health.

### Government Assuming the Burden in Brazil

In Brazil official agencies are taking over the burden of hookworm control and are going forward with great energy in the development of a general program of public health. In the autumn of 1916 operations were opened in this country with an infection survey followed by a demonstration in the state of Rio. After this first demonstration, for which the Board provided the funds, the service was rapidly extended on the basis of increasing government support to the Federal District and nine states. Response on the part of officials and the people has been hearty. Within four years the influence of the work has reached the entire populated area of the country. The prevalence and menace of the disease have been demonstrated; the people have been interested and instructed; an awakened public sentiment has multiplied appropriations for public health purposes many fold; Federal and state departments of health with en-

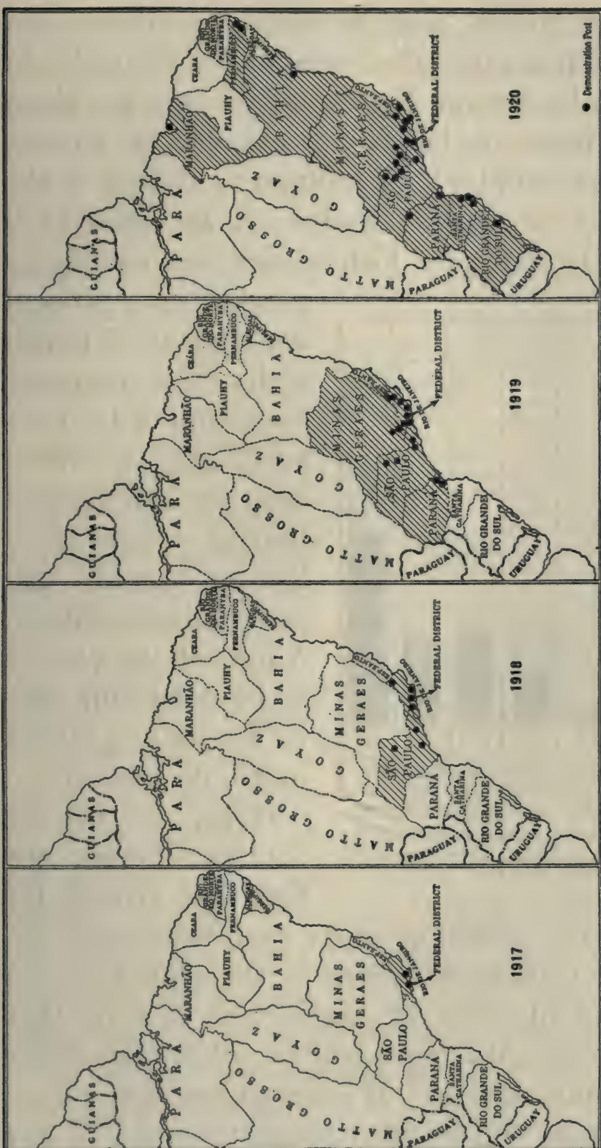


Fig. 28.—Growth of anti-hookworm effort in Brazil. States conducting work and posts maintained, 1917–1920

larged powers and increased resources have united in a national scheme of rural sanitation in which hookworm disease and malaria are given first place. A heartening example of government team-play! In addition to sharing in the scheme of rural sanitation on an equal basis with the states, the Federal service—recently expanded into a national department of health under the energetic leadership of Dr. Carlos Chagas—is organizing for the Federal District special services for venereal diseases and tuberculosis. A part of the plan is to be a training center for visiting nurses in Rio de Janeiro.

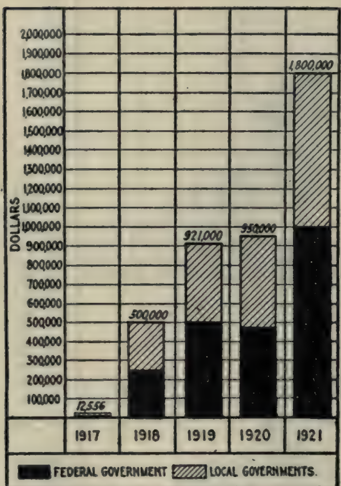


Fig. 29.—Increase in funds appropriated for rural sanitation by Federal and local governments in Brazil, 1917–1921

Here, as in the Southern States, the time has arrived for gradually releasing funds that have been devoted to demonstrations in the control of one disease in order to apply them in ways that may serve the cause to best advantage under present conditions. It is recognized that among the more important immediate needs in the

further development of effective service in Brazil are: the introduction of the trained visiting nurse; county organization as an integral part of the state system; and at least one institution adequately equipped to provide training for the personnel needed to meet the requirements of this almost unprecedented expansion in public health resources and activities.

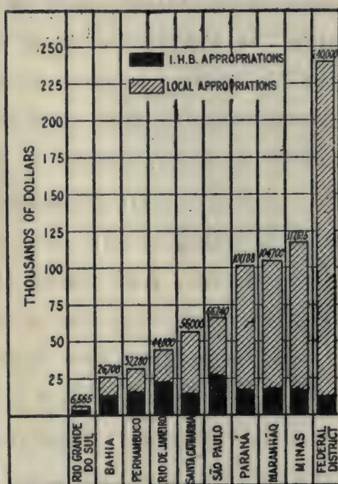


Fig. 30.—Funds available for hookworm work in Brazil, 1920, by states

#### Progress in Central America

The Central American republics are small and their resources are limited. Measures against hookworm disease were undertaken in these countries in 1914 and 1915 with little expectation of rapid development in general sanitation. Expectations are being exceeded. In **Guatemala** under the new government the public health service has been reorganized and provided with larger resources; by executive decree latrine construction has been made obligatory; and fellowships are being provided for the better training of personnel. In **Salvador** preventive measures

are in progress in twelve of the fourteen departments; Government has reorganized the national health service; is laying the foundation of a diagnostic laboratory service; and has made available for the year about $97,000 for public health purposes. In **Nicaragua** considerable progress is being made in soil sanitation; Government is establishing a national department of health and is asking the Board's counsel in its organization; and a fellowship has been provided as a first step in the training of men for this service. In **Panama** a permanent sanitary staff is being slowly but steadily developed; and Government has more than doubled its annual appropriation for the work.

In **Costa Rica** the first stage of the work has been completed. The country has been systematically covered; Government has steadily increased its support and has created a national department of health with a special division for the control of hookworm disease. According to present plans entire responsibility for the support and administration of the work is to be transferred to national authorities, and the Board's representative is to be withdrawn by the end of July, 1921. A limited number of fellowships are to be provided for the training of Costa Rican physicians for the new Government service.

Fig. 31.—Tuberculosis patients cared for by public health clinic. One feature of county health work. Grenada county, Mississippi

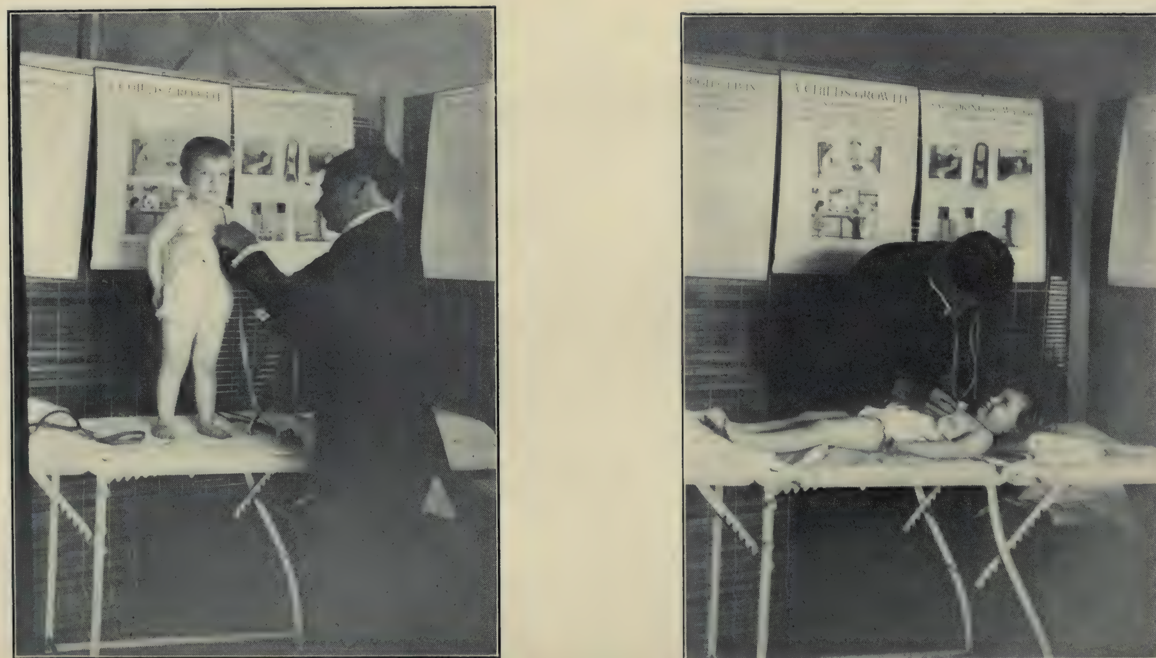

Fig. 32.—Baby clinic, where children from six months to five years were given free medical examination. Another feature of county health work, Grenada county, Mississippi

### First Demonstration in Colombia

The first demonstration in measures against hookworm disease in Colombia was opened with official ceremonies in June, 1920. A survey carried out during the previous year had suggested an average infection of about 75 per cent for the entire population. It is estimated that there are in the country approximately 3,250,000 infected persons, more than 300,000 of whom have been rendered non-productive by this one preventable disease. Officials, planters, and the people are keenly interested and have given active support. Government has pushed soil sanitation far in advance of the mobile clinics and within six months has increased its tax-supported sanitary staff from eleven to eighty-five. One hears talk of a ministry of health. In the meantime the Board is providing fellowships in public health for a limited number of promising young Colombian physicians.

### Promoting Sanitation in the Far East

Hookworm control as a means to public health is making progress in the Far East. Notable developments in **Australia** are reported in a separate section. **India**, with its population of more than 300,000,000, suffers the handicap of an extremely heavy infection and for years has served as an endemic focus from which, through

the emigration of labor, the disease has been carried to many lands. It is among the Tamil coolies imported from South India that the heavier infection is found today in Ceylon, the Federated Malay States, Fiji, Natal, British Guiana, and some of the West Indies. The first systematic attack on the disease at this important source was made by Lieut. Col. Clayton Lane, of the Indian Medical Service, in 1916 on the tea estates of Assam. In response to official request the Board sent a representative during the year to direct operations in Madras presidency, and it has under consideration a similar proposal from Bengal. The island of **Mauritius** has been surveyed preparatory to an active campaign. In **Fiji** Government is undertaking advance soil sanitation in preparation for a revival of the field clinics which were suspended during the war. In **Ceylon** the clinics, having completed for the time being their work on the rubber and tea estates, have been transferred to the low-country villages for a series of demonstrations among the native Singhalese. By joint action of Government and planters, sanitation on the estates is being continued but on most of them has not yet reached a satisfactory standard. In the **Seychelles** Government has undertaken a thoroughgoing demonstration in hookworm control. The islands have been cov-

ered by a systematic campaign of treatment and education, sanitation is being continued under official inspectors, and as shown by re-survey carried out during the year a marked reduction in the infection rate has been accomplished. In **Siam**, with strong Government backing and energetic Red Cross participation, the field clinics are treating more than 1,000 persons per week. Soil sanitation is making perceptible progress, though under extreme difficulties, and an active educational propaganda is driving home over a wide region the lessons the clinics are teaching. Government has recently expressed a desire to have the work, which hitherto has been confined to northern Siam, made national in scope. This move makes acute the need of a modern medical school in Bangkok for the adequate training of Siamese physicians.

### Creating a Ministry of Health in Australia

Australia has shown its usual enterprise in taking advantage of the presence of a relatively light hookworm infection in a limited region for the promotion of a Commonwealth scheme of public health. The movement began in 1917 with an infection survey of Papua. A survey and demonstration in Queensland the following year led to an undertaking on a national scale in which the Federal quarantine service and the

states united. For two years under this joint arrangement the country has had a demonstration in effective team-play. Officials, physicians, and the people have given support; measures for the control of hookworm disease are being expanded into a more comprehensive plan of rural sanitation; and the new service is being extended to the states, to Papua, and to the territory formerly known as German New Guinea. And now comes report of a step of far-reaching importance. To meet its share of the increasing responsibility the Commonwealth government has created a ministry of health. Under the energetic leadership of Dr. J. H. L. Cumpston, formerly head of the Federal quarantine service, no time is being lost in its organization. In response to request the Board has undertaken to lend to the new ministry during the early stages of its development the services of Dr. Sawyer—its present representative in the country,—of an industrial hygienist, and of a sanitary engineer; to assist in the maturing of plans for a public health laboratory service; and to provide a limited number of fellowships for the training of Australian personnel.

### Field Studies

The Board has not entered the field of research as such; it is engaged primarily in promoting

Fig. 33.—Czechoslovakian commission just before sailing to make a tour of medical centers in England and the United States. Left to right, standing: Dr. Vacek, Dr. Halik, Dr. Bazika, Dr. Hovorka (secretary to Minister of Public Health), Dr. Petrik. Left to right, sitting: Mr. Kolinsky, Col. Russell, Dr. Prochazka (Minister of Public Health), Prof. Gunn. (Col. Russell and Prof. Gunn were not members of the commission)


Fig. 34.—The International Health Board has provided thirty-four fellowships for advanced training in public health. The map indicates the countries from which the students have come

the more effective use of the knowledge which we have in the control of disease. It does aid in developing schools of hygiene which are expected to add to knowledge, and it contributes directly to research when in need of an answer to questions arising from its practical field work. During the year field studies have been conducted concerning hookworm infection; treatment of hookworm disease; technique of stool examination; fish as a factor in mosquito control; and effect on malaria incidence of screening, killing mosquitoes in dwellings, and impounding water in bayous. Members of the field staff have assisted Dr. Noguchi of the Rockefeller Institute in the further testing of his yellow fever vaccine and serum. Results of the studies in the treatment of hookworm disease carried out by Dr. Darling and Dr. Smillie in Brazil are being put to practical test in a number of field clinics in that country, with indications of a very considerable gain in speed and economy of operation.

### Public Health Laboratory Service

The laboratory and reliable vital statistics are the necessary basis of intelligent public health administration. In response to repeated requests for counsel the Board has made provision, in the appointment of Colonel F. F. Russell

of the Army Medical Service to membership on its staff, for giving aid to governments in organizing or further developing their public health laboratory service. He has given such assistance during the year to Alabama, Mississippi, Kansas, and Czechoslovakia.

### Creating a Health Service in Czechoslovakia

Under the Empire the administration of public health for the areas now constituting Czechoslovakia was centered in Vienna and Budapest. The present Government is confronted with the task of creating a new service and training a staff to administer it. By invitation two representatives of the Board visited Prague in February for conference with Government authorities and a preliminary study of conditions. Proposals matured at that time and approved by the Board at its meeting in May are now in operation. The Board has a representative at Prague placing American experience at the service of the ministry and interpreting Czech conditions and experience to the home office; as guests of the Board a group of officials representing the ministry have visited England and the United States to study public health administration; thirteen fellowships in public health have been provided for young Czech physicians in training

for the service being developed at home; and during the autumn the Board's laboratory specialist visited the country and assisted in maturing plans for a national public health laboratory service. The plans provide for a laboratory at Prague, with branch laboratories, as the service requires, at suitable points throughout the country. The scheme will center in an institute of public health with seven divisions: providing for anti-rabic vaccinations; production of smallpox vaccine; production of sera; food inspection; drug inspection; diagnostic laboratory; and courses for the training of public health workers. It is to be under the ministry of health and on the side of instruction is to be intimately related to the University Medical School. Government has appropriated for public health purposes for the year 1921, 81,891,717 crowns.

### Institutes of Hygiene and Training in Public Health

The key to permanent progress is in the development of the science of hygiene and the training of men for practical public health administration. There is opportunity at the present time for important work by a limited number of institutions with adequate resources that shall undertake to cover broadly the field

of hygiene and public health, and to combine with the work of instruction and of practical training the cultivation of the fundamental sciences. In addition to these there will be more abundant facilities in the form of short intensive courses for the continued improvement of the workers in the service. The Johns Hopkins School of Hygiene and Public Health enrolled during the year one hundred students, of whom twenty-nine took the short course. Proposals have been submitted for the development of schools of public health at Prague and at São Paulo, Brazil. The Board contributed toward the maintenance of a health officers' institute or short course in Georgia; and plans are being matured for a similar institute for visiting nurses in the state of New York. The Board provided during the year thirty-four fellowships in public health for selected physicians from ten countries: Mexico, Salvador, Costa Rica, Porto Rico, Colombia, Brazil, France, Czechoslovakia, Canada, and the United States.

## Publications

The following is a complete list of the reports and publications issued by the International Health Board during the year 1920:

PRINTED REPORTS (*for general distribution*)

Annual Report for the Year 1919.

Hookworm and Malaria Research in Malaya, Java, and the Fiji Islands (Report of Uncinariasis Commission to the Orient, 1915-1917). By S. T. Darling, M.D., M. A. Barber, Ph.D., H. P. Hacker, M.D.

LITHOGRAPHED REPORTS (*for limited distribution*)

Annual Reports for 1919 on Work for the Relief and Control of Hookworm Disease in the following countries:

**West Indies**

| | |
|---|---|
| British Guiana | Dr. F. W. Dershimer |
| Jamaica | Dr. P. B. Gardner |
| St. Lucia | Dr. Stanley Branch |
| Trinidad | Dr. G. C. Payne |

**Central America**

| | |
|---|---|
| Costa Rica | Dr. Louis Schapiro |
| Guatemala | Dr. W. T. Burres |
| Nicaragua | Dr. D. M. Molloy |
| Panama | Dr. F. A. Miller |
| Salvador | Dr. C. A. Bailey |

**South America**

| | |
|---|---|
| Brazil | Dr. L. W. Hackett |

**The East**

| | |
|---|---|
| Ceylon | Dr. W. P. Norris |
| Queensland | Dr. W. A. Sawyer |
| Seychelles | Dr. J. F. Kendrick |
| Siam | Dr. M. E. Barnes |

Report on Hookworm Infection Survey and Malaria Survey of Porto Rico from December 26, 1919, to January 28, 1920—Dr. J. B. Grant.

Report on Use of Top Minnow (*Gambusia affinis*) as an Agent in Mosquito Control—Dr. H. H. Howard.

### Articles and Reprints

The following is a list of other contributions to medical and public health literature which were made during the year, most of them in the form of

articles published in medical journals that are widely circulated among persons interested in medical and public health topics:

Dr. C. C. Bass

Attempt to explain the greater pathogenicity of Plasmodium falciparum as compared with other species. *Journal of Tropical Medicine and Hygiene*, Oct. 1, 1920, v. 23, p. 237–238.

Campaign against malaria: malaria, how to get rid of it. Mississippi State Board of Health. *Health Bulletin*, Oct.–Dec., 1920, v. 8, p. 1–2. Same reprinted.

Responsibility of physicians who treat malaria cases. *Southern Medical Journal*, Oct., 1920, v. 13, p. 693–695.

Studies on malaria control:

No. 10. Cure of infected persons as a factor in malaria control. *American Journal of Public Health*, Mar., 1920, v. 10, p. 216–221. Same reprinted.

No. 11. Control of malaria by quinine sterilization of the human host. *Southern Medical Journal*, Apr., 1920, v. 13, p. 250–256. Same reprinted.

Dr. M. E. Connor

Yellow fever control in Ecuador; preliminary report. *Journal of the American Medical Association*, Mar. 6, 1920, v. 74, p. 650–651. Same reprinted. Spanish trans. in *Journal of the American Medical Association* (Spanish edition), Apr. 1, 1920, v. 3, p. 456–458. Same reprinted.

Yellow fever in Ecuador; final report. *Journal of the American Medical Association*, Oct. 30, 1920, v. 75, p. 1184–1187. Same reprinted.

Dr. S. T. Darling

Experimental inoculation of malaria by means of Anopheles ludlowi. *Journal of Experimental Medicine*, Sept. 1, 1920, v. 32, p. 313–329. Same reprinted.

Observations on the geographical and ethnological distribution of hookworms. *Parasitology*, Sept., 1920, v. 12, p. 217–233. Same reprinted.

Suggestions for the mass treatment of hookworm infection. *Lancet*, July 10, 1920, v. 2, p. 69–72. Same reprinted.

Dr. S. T. Darling & Dr. W. G. Smillie

Teaching of vital statistics to medical students in Brazil. *Journal of the American Medical Association*, July 31, 1920, v. 75, p. 337–339. Same reprinted.

Dr. J. A. Ferrell

Results of recent efforts to control malaria. *Southern Medical Journal*, Apr., 1920, v. 13, p. 256–260. Same reprinted.

Rôle of the latrine in the control of hookworm disease. *American Journal of Public Health*, Feb., 1920, v. 10, p. 138–140. Same reprinted.

Compensation of health officers. *American Journal of Public Health*, July, 1920, v. 10, p. 569–575. Same reprinted.

Dr. W. C. Gorgas, Dr. H. R. Carter, & Dr. T. C. Lyster

Yellow fever; its distribution and control in 1920. *Southern Medical Journal*, Dec., 1920, v. 13, p. 873–880. Same reprinted.

Dr. Juan Guiteras

Observations on yellow fever in Martinique. *Sanidad y Beneficencia*, Havana, Apr.–June, 1920, v. 23, p. 232–236.

Dr. L. W. Hackett

O problema da uncinariose (The hookworm problem). *Brazil-Medico*, Rio de Janeiro, July 31, 1920, v. 34, p. 497.

Dr. H. H. Howard

Malaria control in communities by anti-mosquito measures. Mississippi State Board of Health. *Health Bulletin*, Oct.–Dec., 1920, v. 8, p. 2–5. Same reprinted.

Malaria control in rural communities by anti-mosquito measures. *Southern Medical Journal*, Apr., 1920, v. 13, p. 260–266. Same reprinted.

E. C. Meyer

Community medicine and public health. *American Journal of Public Health*, June, 1920, v. 10, p. 489–497. Same reprinted.

Discussion of Dr. Emerson's paper, "A standard budget." *American Journal of Public Health*, Apr., 1920, v. 10, p. 353–354.

Methods for the defense of public health appropriations. *American Journal of Public Health*, Mar., 1920, v. 10, p. 201–209. Same reprinted.

Dr. G. P. Paul

The planters and hookworm disease. *Planters' Chronicle*, Coimbatore, Madras, India, Oct. 2, 1920, v. 15, p. 672–674.

Dr. W. G. Smillie

Beta-naphthol poisoning in the treatment of hookworm disease. *Journal of the American Medical Association*, May 29, 1920, v. 74, p. 1503–1506. Same reprinted. Spanish trans. in *Journal of the American Medical Association* (Spanish edition), June 15, 1920, v. 3, p. 798–802.

Plague-like organisms in the wild rats of São Paulo, Brazil. *Journal of Infectious Diseases*, Oct., 1920, v. 27, p. 378–384. Same reprinted.

Prevalence of Leptospira ictero-hemorragiae in the wild rats of São Paulo, Brazil. *Bulletin, Société de Pathologie Exotique*, Paris. July 7, 1920, v. 13, p. 561–568. Same reprinted.

Dr. G. K. Strode

Medical inspection of schools in Pennsylvania. *Modern Medicine*, Nov., 1920, v. 2, p. 758–761.

Dr. H. A. Taylor

Malaria control through the application of anti-mosquito measures and some of the results obtained in southeast Arkansas. *Southern Medical Journal*, May, 1920, v. 13, p. 339–344. Same reprinted.

G. E. Vincent

America's world war against disease. *New York Times Current History*, Oct., 1920, p. 131–136.

Ideals and their function in medical education. *Journal of the American Medical Association*, Apr. 17, 1920, v. 74, p. 1065–1068. Same reprinted. Spanish trans. in *Journal of the American Medical Association* (Spanish edition), June 15, 1920, v. 3, p. 795–798. Same reprinted.

The missionary doctor in China; past achievements and future outlook. *China Medical Journal*, Shanghai, May, 1920, v. 34, p. 325–328. Same reprinted.

The Rockefeller Foundation's work in Pan-America. *Bulletin, Pan-American Union*, Washington, Oct., 1920, v. 51, p. 389–403.

Dr. B. E. Washburn

Co-operative county health work in North Carolina. *Southern Medical Journal*, Oct., 1920, v. 13, p. 710–712.

Dr. B. L. Wyatt

Work of the Commission for the Prevention of Tuberculosis in France in the department of Eure-et-Loir. *American Review of Tuberculosis*, July, 1920, v. 4, p. 347–369. Same reprinted.

Dr. F. C. Yen

Control of hookworm disease at the Pinghsiang colliery, Ngan Yuen, Kiangsi. *National Medical Journal of China*, Shanghai, June, 1920, v. 6, p. 71–92.

# APPENDIX

## ACKNOWLEDGMENT

Extensive use has been made of the following special articles and reports in compiling the appendix, particularly the sections dealing with hookworm disease and county health work:

"Studies on Hookworm Infection in Brazil," by S. T. Darling and W. G. Smillie; published as monographs of the Rockefeller Institute for Medical Research, New York City, 1921.

"Studies in Relation to the Technique of Field Campaigns," by W. G. Smillie.

"Co-operative County Health Work in North Carolina," by B. E. Washburn; published as health bulletin of North Carolina State Board of Health, Raleigh, N. C., January, 1920.

In certain instances the authors' own words have been used. The Board is indebted to these as well as to many other members of the staff for contributions in the form of reports and articles which have made possible the following statement of findings and results.

# APPENDIX

## I

## EXTENT AND SEVERITY OF HOOKWORM DISEASE[1]

During 1920 hookworm infection surveys were conducted in sixteen areas.[2] In these areas the incidence as indicated by microscopic examination of feces ranged from the complete absence of infection recorded in four Australian states to the almost universal infection recorded in the states of Bahia, Pernambuco, and Maranhão, Brazil. In areas where the rate of infection was high the disease was found to be prevalent even among those who had the means to cure and who protect themselves against it. Thus, in the state of Santa Catharina, in Brazil, 78 per cent infection was recorded among those who could read, 57 per cent among those who claimed to use latrines, and 46 per cent among a group of teachers, doctors, druggists, lawyers, and fazenda or plantation owners.

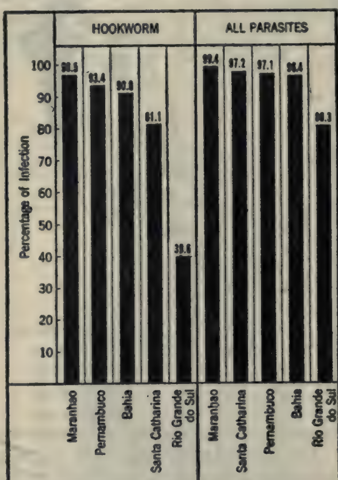


Fig. 35.—Incidence of hookworm and other parasitic infection in five Brazilian states surveyedduring 1920

**Distribution of Hookworm Disease in Brazil.** Surveys have now been made of all the larger states of the Brazilian littoral except Pará. The general results are indicated on the map, Fig. 36. The southern boundary of Bahia may be taken as the dividing line between an area of severe infection to the north and an area to the south where the infection, although probably still high in rural regions, is on the

[1] Based on 1920 infection surveys.

[2] The states of Bahia, Pernambuco, Maranhão, Rio Grande do Sul, and Santa Catharina in Brazil; the republic of Colombia; the islands of Porto Rico, Santo Domingo, and Mauritius; the presidency of Madras, India; and the states of Queensland, South Australia, Victoria, Northern Territory, New South Wales, and Tasmania in Australia.

average less intense. This area of less intense infection extends to the southern boundary of São Paulo. Along the coast the incidence remains about 80 per cent to the extreme southern limit of Brazil, although in the southernmost state—Rio Grande do Sul—this condition is confined to a very narrow strip indeed. A little further inland the incidence drops to 70 per cent, and beyond falls away rather abruptly to nothing.

Infection along the littoral seems to be invariably more severe than further inland. This condition is probably due in the different regions to different combinations of causes, into which enter climate, concentration of population, and prevailing occupations of the rural inhabitants. In northern São Paulo and southern Minas the high incidence of infection seems to be due mainly to intensive agriculture; in Rio and Santa Catharina to particularly favorable conditions of soil, temperature, and moisture. In the three northern states surveyed the difference is slight but still apparent (Fig. 36).


Fig. 36.—Distribution of hookworm infection in Brazil, as indicated by infection surveys. Note extreme high incidence along the coast

There remain along the coast six states of relatively small areas which have not yet been surveyed. The indications are that two of these—Piauhy and Ceará, which lie between Maranhão and Bahia—will not show the same high incidence of infection as the latter states. Piauhy and Ceará suffer periodically from long-continued droughts—sometimes a year passes without rain; and this situation in itself would tend to control hookworm infection. Alagoas and Sergipe will probably show the same infection as the bordering states of Pernambuco and Bahia; Parahyba and Rio Grande do Norte may be expected to show a transition from the universal infection of Pernambuco to the less serious situation supposed to exist in Ceará.

In the great interior states of Brazil the population is so sparse that hookworm disease becomes one of the less important problems.

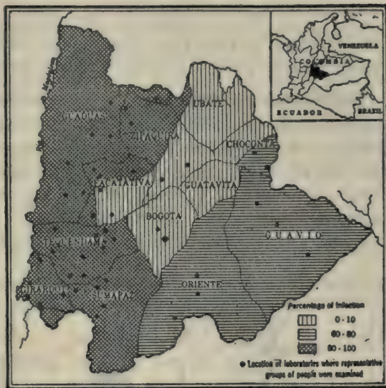


Fig. 37.—Infection survey map of Cundinamarca, Colombia. (Insert shows location of the department in the republic)

**Infection Rate in Colombia.** In the infection survey of Colombia, investigation was limited to the department of Cundinamarca. This department includes within its boundaries all the climatic zones into which the country is divided and is believed to be fairly representative of the country at large.

Examination of 8,465 representative persons from forty-five different districts and all of the zones showed 6,613, or 78.1 per cent, to be harboring hookworms. The incidence was found to vary inversely with the altitude, decreasing rapidly as the cold zone was approached. The highest rate of infection (88.1 per cent) was found in the provinces of Guaduas and Tequendama; the lowest (9.6 per cent) in Bogotá and Guatavita (Fig. 37).

The survey findings in Cundinamarca showed that the people who lived in districts having an altitude of less than 6,600 feet had an average infection rate of 84.4 per cent. Among those who lived in higher altitudes the average percentage of infection was 20.4 (Fig. 38). By applying these figures to the country as a whole, it was calculated that in a population of 5,072,613 there were as many as 3,320,602 infected persons. Since 10 per cent is a reasonable estimate of the number of hookworm cases

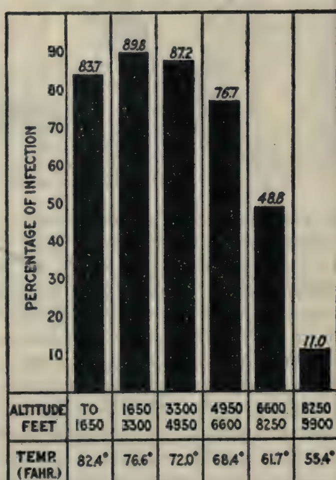


Fig. 38.—Hookworm infection in relation to altitude. Colombia. In zones of less than 6,600 feet elevation, infection was practically universal

that are unable to work, the survey may be taken as indicating that the nation is supporting more than 300,000 persons who have been rendered non-productive by a single preventable disease.

**Incidence of Infection in Santo Domingo.** An estimate based on the findings of the survey of Santo Domingo places the approximate incidence of infection for the country at about 50 per cent. In the Cibao, the fertile valley lying north of the central mountain range, where live 57 per cent of the total population, the rate of hookworm infection was 67.4 per cent (Fig. 39). This region is not only the most densely and uniformly settled part of the country, but


Fig. 39.—Distribution of hookworm disease in Santo Domingo

it presents, with its soil of rich loam and its constantly recurring rainfall, conditions almost ideal for the propagation of hookworm larvae. In the plains south of the mountain range, where dwell an additional 28 per cent of the population—living chiefly along the seacoast—the infection revealed was 43 per cent. Here was found the greatest variation in the incidence of infection; it was heaviest in the vicinity of the capital and lowest in the more sparsely settled sections lying along the southeastern coast. The arid western area, comprising the provinces of Monte Christin Azua and Barahona, with a very sparse population which approximates only 15 per cent of the total for the country, revealed a hookworm incidence of 11.4 per cent.

The clinical results of the infection are not severe, probably because the population is largely of negro blood and the infection is in the main of recent origin. Tests made during the course of the survey showed that the hemoglobin of persons with hookworm disease was not greatly reduced. In 283 infected persons the average hemoglo-

bin was found to be 74.4 per cent, as compared with an average hemoglobin of 79.3 per cent in 221 uninfected persons. Nevertheless, in spite of the fact that the disease has thus far caused little clinical anemia, there is much to indicate that its presence is a serious hygienic and economic problem and likely to become an ever more pressing one as time goes on. The need of controlling it, therefore, stands among the more important specific sanitary problems to be met by the island government.

**Hookworm Infection in Mauritius.** In Mauritius not less than two of every three among the 2,867 persons examined were found to be harboring the hookworm parasite. The persons examined included all ages, all races, and both sexes, and were chosen indiscriminately over wide areas. The infection rate ranged from 29.4 per cent among residents of the Port Louis district to 100 per cent among those of Moka (Fig. 40). From the survey records it may be conservatively estimated that 226,000 persons in the colony are infected.

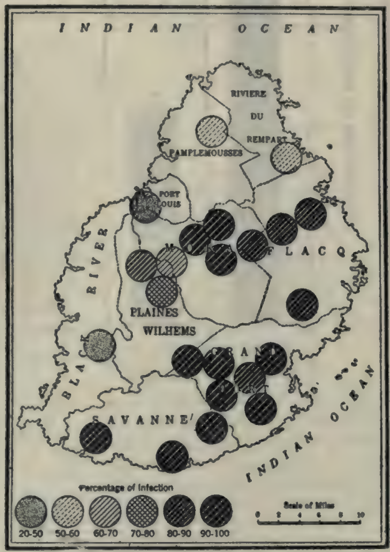


Fig. 40.—Hookworm infection survey map of Mauritius

The effects of the disease fall most heavily on the East Indian estate laborers, many of whom are extremely weak, anemic, and edematous, and suffer from disturbances of the heart. Persons presenting these symptoms were seen in all parts of the island, but more frequently in the districts with the higher percentages of infection. Districts with much rainfall had consistently higher and more severe types of infection than those with little rainfall, the incidence of infection in wet and dry districts being, respectively, 74.6 and 44.7 per cent (Fig. 41).

**Hookworm Survey of Madras Presidency, India.** Demonstrations or surveys were conducted during 1920 in the Cannanore jail in Madras presidency, India, on various tea estates, and later in the city of Madras. On the tea estates a total of 2,300 laborers were examined, and the infection rates were found to vary from 83 per

cent among laborers from dry districts to 100 per cent among those from wet districts. Among 964 inmates of the Cannanore jail, a hookworm incidence of 89.7 per cent was found. Prisoners drawn from all but three of the twenty-four districts of the Presidency were included in the number examined. There were very few instances of severe or even moderately severe hookworm disease among the prisoners; among the estate laborers, on the other hand, the proportion of severe cases, as determined by clinical observations as well as by hemoglobin tests, was very large.

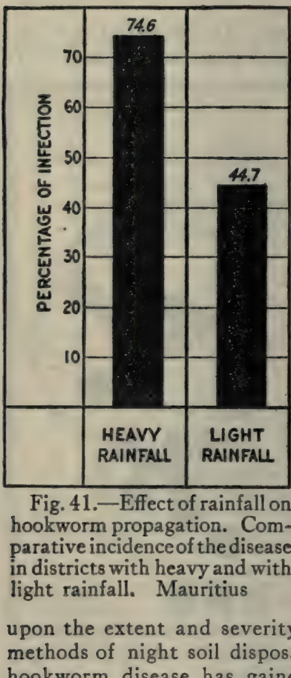


Fig. 41.—Effect of rainfall on hookworm propagation. Comparative incidence of the disease in districts with heavy and with light rainfall. Mauritius

The city of Madras was chosen for investigative work in an industrial center. Among urban residents employed in the cotton and silk mills of the city, two of every three persons examined were found to be infected. The rate of 55.7 per cent found among school children, who almost without exception go barefoot, was in sharp contrast with the rate of 15.8 per cent which obtained among teachers, almost all of whom wear shoes.

**Hookworm Infection Not Widespread in Australia.** The results of the work in Australia up to December 31, 1920, lead to the conclusion that hookworm infection is confined principally to irregular pockets and is not very widespread. The principal factor determining the shape and position of the pockets seems to be rainfall. This has greater influence upon the extent and severity of infection than have variations in methods of night soil disposal; in some communities of low rainfall hookworm disease has gained no foothold in spite of the grossest carelessness in the disposal of feces.

**Relationship between Rainfall and Infection.** Surveys conducted during the year in South Australia and Victoria, where rainfall is low and occurs mostly in winter, indicate that hookworm disease is absent from the mines as well as from the surface. Similarly, a survey of the important group of deep mines at Broken Hill, in New South Wales, and another survey begun on a small scale in and around the city of Darwin, in Northern Territory, have disclosed no hookworm infection.

In Papua the infection rate is high, 58.8 per cent of the 18,088 persons examined to date having been found infected. Even in this

Fig. 42.—Worms recovered from nine-year-old boy as result of one treatment with oil of chenopodium. Eighty-nine hookworms and eighty-one Ascaris. This demonstration induced many to apply for treatment. Brazil

Fig. 43.—Laborers at estate camp in island of Mauritius. One hundred per cent hookworm infection

tropical country, however, there is an area along the southern coast in which rainfall is low and the incidence of hookworm disease is much reduced. Of the areas examined on the continent of Australia, only the state of Queensland has thus far shown a serious hookworm problem; even here, however, the infection is confined to a narrow strip of coastal area. Inland from the coastal ranges the rainfall is low and hookworm disease is rare or absent (Fig. 44.)

**Racial Incidence of Infection.** Infection by race presents a curious anomaly in Australia. In the few places where the aborigines still live together, they have a much higher infection rate than the white people of the same district. It is only occasionally that a community is found where more than 30 per cent of the whites are infected. Aborigines living under the same conditions are all likely to be infected. In Papua, also, the high infection is almost entirely limited to natives. There are, however, only a few whites living in the latter territory.

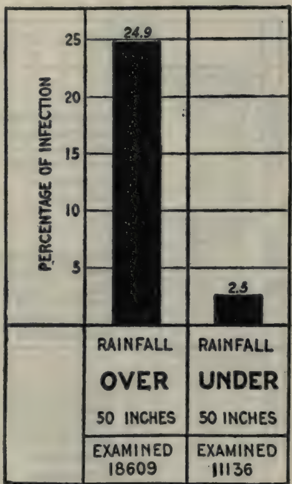


Fig. 44.—Relation of rainfall to hookworm incidence. North Queensland, Australia

## SEVERITY OF HOOKWORM DISEASE

Usually, the higher the percentage of persons infected in a given locality, the larger is the average number of worms harbored by infected persons, the more severe are the symptoms, and the more difficult is it to bring the disease under control. Rates in the preceding paragraphs relating to the incidence (but not the severity) of the infection are based entirely on the results of search with the microscope for eggs in the feces. The work of Darling and Smillie has shown, however, that the microscope offers no trustworthy index of the *number* of worms harbored by infected individuals. This information may be accurately ascertained only by giving the persons a vermifuge and counting the worms expelled after the drug has acted. Studies which seek to establish through microscopic examination the relationship of race, sex, age, occupation, and similar factors to the *incidence* of hookworm infection lose a large part of their value when considered in the light of information revealed by the worm-count method.

**Value of Worm-Count Surveys.** The fact that the microscope cannot be expected to reveal differences in the amount of the infec-

tion was demonstrated, for instance, in the state of São Paulo, where worm counts showed that male coffee pickers had 350 worms on the average while their wives had only fifty; yet the microscope could do no more than call positive both the husbands and the wives.

Worm counts are scarcely practicable when the incidence or severity of the disease is to be studied over a wide area and within a limited period of time. Nevertheless, it is sometimes feasible to make them as an incidental feature of the work within restricted areas, and this was done in the course of the infection surveys conducted during 1920 in the states of Pernambuco and Santa Catharina, Brazil. In Pernambuco from 500 to 800 worms were repeatedly recovered from the feces passed by agricultural laborers during the first few hours after treatment, and in Santa Catharina the worms obtained after treatment with thirty-five to forty drops of chenopodium ranged from 1 to 1,156. One child of five years expelled 412 hookworms. In the latter state, moreover, children from nine to twelve frequently expelled from 100 to 150 Ascaris (Fig. 42).

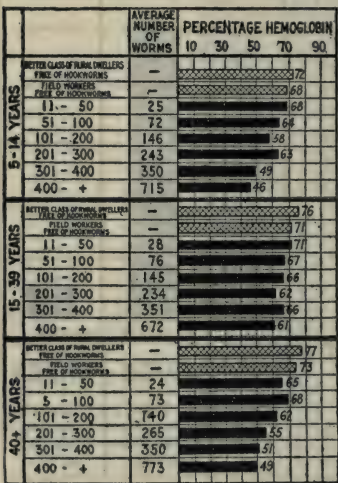


Fig. 45.—Children and old people in rural Brazil suffer more severely than young adults from the effects of hookworm disease. Hemoglobin index in relation to number of hookworms harbored. Distribution by age groups

**Correlation between Number of Hookworms and Hemoglobin Index.** The hemoglobin index is a very good means for determining, in the case of individuals as well as of groups, the degree of injury that hookworms are producing. Fig. 45 illustrates the relationship between the hemoglobin index and the number of hookworms as ascertained by Drs. Darling and Smillie in their work in rural Brazil. Seventy-five worms are seen to produce in all groups a definite lowering of the hemoglobin amounting to about four points. As the worms increase in number beyond this figure, the hemoglobin of children and of persons more than forty years of age declines rapidly and continuously until the index of cases with upward of 400 hookworms is more than twenty points below normal.

Persons between fifteen and thirty-nine offer such strong resistance to the disease that even 675 to 700 hookworms cause a decline

in hemoglobin of only ten points. In interpreting these facts, it should be borne in mind, however, that hookworm infection is slowly acquired, that the blood-forming elements of the bone marrow are active, and that the body defenses struggle against the hookworms to retain the normal hemoglobin. In older individuals and in children the body defenses have little endurance, and if hookworm infection is heavy, the battle is a losing one.

**Hookworm the Chief Anemia-Producing Factor in Santa Catharina.** In a study of 9,482 persons in Santa Catharina hookworm disease was easily incriminated as the chief cause of anemia. As a single factor in the production of anemia it appeared on the average more potent than malaria, although it produced its severest anemia only when in conjunction with malaria. Regionally and occupationally the infection was correlated with the intensity of anemia. It was evident that of all the groups examined the inhabitants of the coastal plain (90 to 95 per cent infected) suffered most severely from anemia, and chief among them the field workers (94 to 98 per cent infected), who represent one fourth of the population and are the chief producers of wealth. Second in both extent and gravity of anemia were those less than nineteen years of age (90 to 93 per cent infected), and third the housewives (80 to 85 per cent infected).

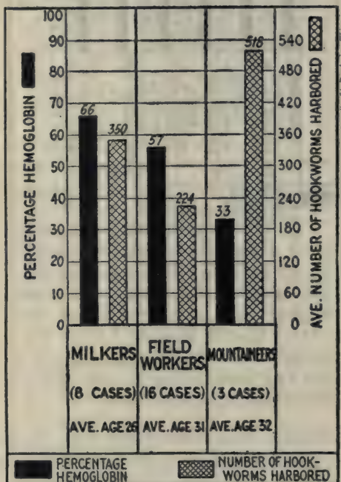


Fig. 46.—Malnutrition and hookworm disease as factors in producing anemia. Comparative study of well nourished and poorly nourished occupational groups. Milkers well fed; field workers moderately well fed; mountaineers poorly nourished. Brazil

**Hookworm Disease and Malnutrition in Relation to Anemia.** In the state of São Paulo, Brazil, however, studies of hookworm disease and the food factor in their relation to the production of anemia suggested that malnutrition, especially when it approaches the point of starvation, is more potent even than heavy hookworm infection in reducing the hemoglobin. One of the São Paulo studies was based on worm counts and hemoglobin tests of eight milkers who engaged in field work part of the time, of sixteen laborers who gave all their time to work in the fields, and of three mountaineers. All of these men were heavily infected. The milkers drank

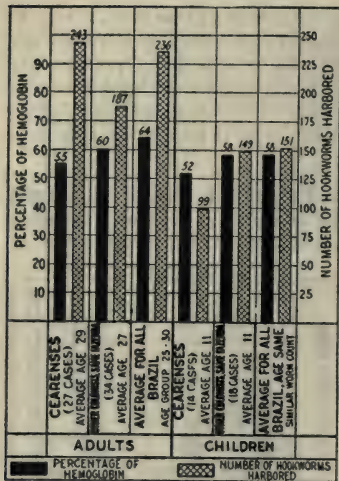


Fig. 47.—Malnutrition and hookworm disease as factors in production of anemia. Resistance to anemia among hookworm infected refugees from famine-stricken district of Ceará compared with that among hookworm infected colonists who had been living on São Paulo plantation for several years

plenty of milk and had other good food; the field workers had good food but no milk; the mountaineers were poor and underfed. Fig. 46 compares the hemoglobin average of the three groups. The milkers were relatively strong and active; the mountaineers were weak and listless.

In another study, forty-one refugees who had migrated to São Paulo from the famine-stricken state of Ceará were compared with fifty-two laborers who were native to the state of São Paulo. Both groups at the time they were studied were eating similar food, living under similar conditions, and performing similar tasks in the fields. Both were infected with hookworms. The São Paulo laborers, who were accustomed to a comparatively full diet, had, as Fig. 47 indicates, a much higher hemoglobin index than the refugees from Ceará, who had suffered from malnutrition. The difference was especially noticeable in the case of children. Those from Ceará harbored only 99 worms, as compared with the average of 149 harbored by those who were native to São Paulo, yet the hemoglobin index of the former group was six points lower than that of the latter.

## II

# FIELD STUDIES OF HOOKWORM DISEASE

Drs. Darling and Smillie have conducted in Brazil a number of investigations in which they have sought to throw light upon the varying incidence and severity of hookworm disease in different groups of the population, and the factors which determine this variation. Their studies have been based on the careful counting of worms expelled by infected persons.[1] They have carried out their experiments in their capacities of Director and Associate Director of the Laboratory of Hygiene at the university of São Paulo, Brazil, and have been assisted in the work by the staff engaged in combating hookworm disease in Brazil.

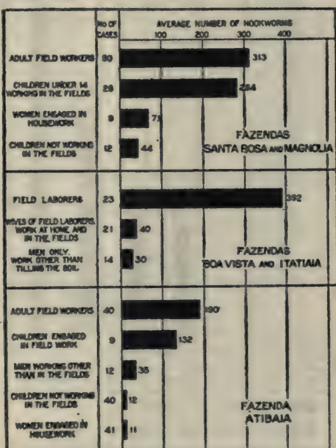


Fig. 48.—Relative intensity of hookworm infection among agricultural laborers and persons engaged in other occupations. 299 cases. Brazil

**Direct Contact with Humid Earth Chief Factor in Infection.** The studies bearing on the relationship between contact with humid earth and the incidence of infection with hookworm disease demonstrated that under Brazilian conditions hookworm is an occupational disease—a disease of those who work in the soil. The number of worms harbored was found to vary directly with the amount of time the individual spent in bare feet in the fields.

Fig. 48 shows that on fazendas in several different states, adults and children who worked barefoot in the field were heavily infected, while those who were engaged about the house harbored but few worms. Almost without exception the more intimate and direct was the contact of these people with the humid earth in which the larvae breed, the more severe was the infection they exhibited.

Contrary to expectation, the average infection of people grouped in villages with little or no sanitation—shopkeepers, barbers, and non-agricultural workers generally—proved to be not so heavy as that of persons living in scattered farmhouses. Even though the

[1] For full discussion of the methods employed, see pages 156 and 157.

soil in and about the villages teems with hookworm larvae, the people themselves are not in actual contact with the soil. Many inhabitants of rural communities, too—persons such as school teachers and plantation owners, who generally live amid good surroundings—showed little infection because their skin did not come in contact with infected soil. Residents of cities with paved streets and latrines were found to be lightly infected unless in recent years they had been workers in the fields.

**Slow Acquisition of Hookworm Infection.** Theoretically it is possible to acquire massive infection with hookworms following a single exposure; the field studies in Brazil showed that actually this does not occur. They indicated, on the contrary, that the infection is gradually acquired, a worm here and another there, and that many days and weeks pass without any addition to the number harbored. This fact is well illustrated in Fig. 49, which shows by age groups the increase in the number of hookworms harbored by children. Those who begin work in the fields at eight years have an average infection of about fifteen worms each. Until the fourteenth year this infection increases at the rate of about fifty worms a year, or approximately one a week. Children who do not work in the fields gain only one worm every six weeks, or eight a year.

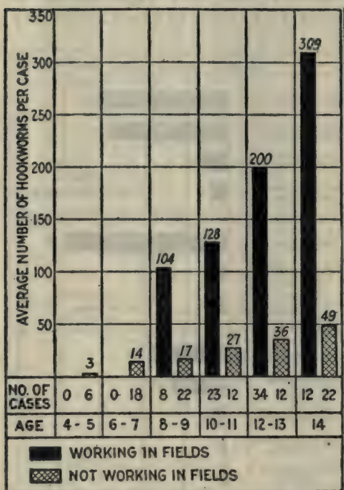


Fig. 49.—Relative intensity of hookworm infection among children working in the fields and those not working in the fields. Classification by two-year age groups. Brazil

At ten years of age, less than half of the children have ten worms each. This means that they have picked up on the average not quite one worm a year. Not a single child of all those examined who were ten years of age or less harbored 150 hookworms. Nevertheless, many of them had been working continuously in the fields and for more than two years had been constantly exposed to the heavily infected soil.

The slow acquisition of the infection was further demonstrated in a group of Japanese colonists engaged in field work in Brazil. Some of them had been working in highly infected soil for about two years, but had only begun to lose the Ancylostomes which they had brought with them from Japan and to acquire the Necators which are common to Brazil. Other Japanese on the same fazenda who had been in

Brazil for more than four years had acquired a large number of Necators, though even by the end of this period they had not acquired so many of the latter species as the average number harbored by native Brazilians who worked side by side with them (Fig. 50). In another instance a woman eighteen years of age who had been a servant in a city home all her life until her marriage to a colonist, when she began to spend some time at work in the field, had not acquired a single hookworm after four months' service, despite the fact that the soil in which she worked was heavily infected.

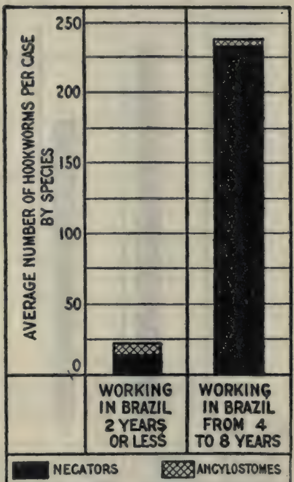


Fig. 50.—Slow acquisition of hookworm infection. It takes Japanese field laborers in Brazil from four to eight years to acquire any considerable number of Necators, the species of hookworm common to the New World

**Slow Loss of Hookworm Infection.** The infection that is gained so slowly is also slowly lost. This was demonstrated by the following instances. A study of a group of people in a village in the state of Rio gave an average of twenty-eight worms among those who did no field work. Two members of this group, a brother and a sister eighteen and twenty-one years of age, respectively, had worked in the fields from childhood until three years previously, when their father moved to the village, became more prosperous, and provided his children with shoes. The brother and the sister then gave up field work and lived under comparatively good hygienic conditions, but when examined still harbored 318 and 233 worms, respectively. The average infection of field workers in the original district was 390 worms.

In the same village a servant girl of twenty-three years who had left the fields four years previously to work in the kitchen of a wealthy landowner, where she was surrounded by the best sanitary conditions, when examined still harbored 369 worms. Another young woman who, after having worked for years in the fields, had been married three years previously and had since devoted herself to housework, yielded when treated a total of 379 worms.

**Effect of Shoes on Infection.** Any factor that limits or prevents the contact of bare feet with humid earth should lower the degree of infection. Drs. Darling and Smillie gave attention to the use of shoes as a factor of this kind. In rural Brazil it is almost the universal custom to go barefoot, partly because of the inconvenience which results from wearing shoes and partly because

shoes are so expensive. When working in the field, children never wear them, and adults only rarely.

Groups of adult laborers were studied in three widely scattered localities having conditions practically identical with respect to food, shelter, and type of work. From adult shoe-wearers an average of 27 worms per case was obtained; from barefoot field laborers working side by side with the shoe-wearers, an average of 255 worms per case (Fig. 51). In the family of a Spanish colonist there were six adults who wore in the field a simple, crude, home-made shoe, and four children who went barefoot. From the adults the average number of hookworms obtained was 40; from the children, who should normally have harbored far fewer worms than the adults, 226.

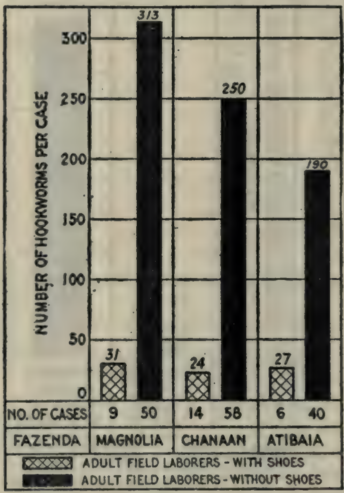


Fig. 51.—Effect of shoes in controlling hookworm infection. Worms harbored by field workers wearing shoes compared with number harbored by those not wearing them. Three coffee plantations in Brazil

**Hookworm a Disease of Young Adults.** So far as representative Brazilian areas are concerned, the investigations of Darling and Smillie have shown that hookworm disease is a disease of youths and young adults, particularly males. It makes its most severe attack on persons between fifteen and forty-five years of age—in the productive period of life. Fig. 52 shows that the number of worms harbored by males rapidly increases up to the fifteenth year; there is then a gradual, slow, and steady increase throughout the active period of life, with finally a break between the ages of forty-five and fifty and a strikingly abrupt diminution after the latter age.

When the field laborer between twenty and forty-five becomes infected with many more than 200 to 300 hookworms—the average for his age period—he becomes unable to spend so many hours in the field as do his less heavily infected fellow-workmen. His enforced absence from the field for a part of the working day lessens his opportunities for acquiring new infection. A certain number of the worms already harbored die off from natural causes and are eliminated. As the worms cannot multiply within the body, the infection then automatically becomes lighter.

Thus the average infection of 200 to 300 hookworms is maintained for twenty years through the economic necessity of earning a living in

the fields, where the laborer acquires infection, and the necessity of resting at home from his labors because of weakness, where he slowly loses infection. For the body-defense forces the battle is a losing one, however; the break in health and strength finally comes between forty-five and fifty years of age. After the latter age the average laborer in Brazil is old and broken, and to preserve his health must give up a large part of his field work and begin to wear shoes regularly.

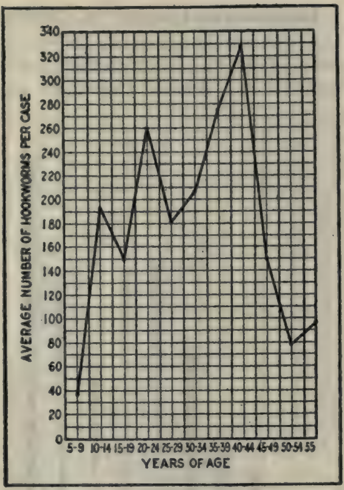


Fig. 52.—Average number of hookworms harbored, by age groups. Based on examination of 381 infected males. Brazil

**Comparative Infection among Males and Females.** A test which included 562 males and females ranging in age from five to fifty years or more, showed that children under ten years of age harbor very few worms, girls a few less than boys. The next decade showed in both sexes a tremendous increase in worm incidence, as it is the period during which the children go to work in the fields, the girls usually taking up the hoe a little later than the boys and working side by side with them. From twenty to forty-five the average number of hookworms harbored by the men remains very constant and very high, while the average number of worms harbored by the women falls after the eighteenth or nineteenth year, when they usually marry, assume household duties, and thenceforward devote but little time to work in the fields (Fig. 53).

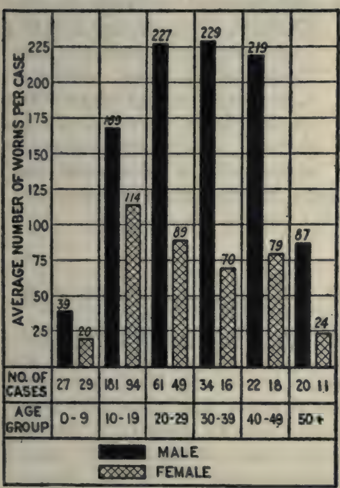


Fig. 53.—Degree of hookworm infection in relation to age and sex. Based on 562 cases. Brazil. Note that females harbor far fewer worms than males

**Hookworm Disease in Children.** A special study was made of the severity of hookworm disease in children. No children under four were included in the studies and very few under six, because it is difficult to secure all the stools passed by very small children. The test included 246 infected males and 147 infected females ranging in age from four to twenty-four years, and representing all classes of society in Brazil. They were chiefly, however, the children of field laborers. In the main they had never been to school, had never worn shoes, and had always lived within a radius of five miles of their homes. The results were subdivided by sex and tabulated according to two-year age groups (Fig. 54).

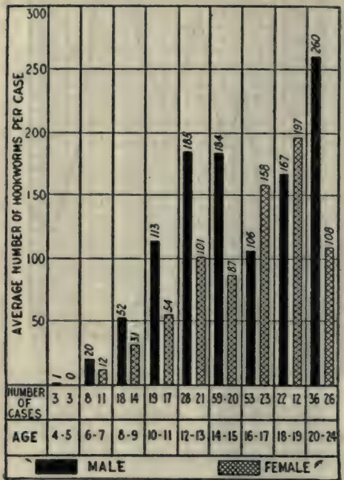


Fig. 54.—Severity of hookworm infection by sex and age groups. Based on worm counts among 393 cases under twenty-four years of age. Brazil

The number of worms harbored was shown to increase gradually and progressively as the person increased in age. Children between four and five had almost no hookworms; those from five to eight, very few. Children over eight who worked in the fields were heavily infected. Among males after the eighteenth to nineteenth year the incidence continued to rise; among females, for the reason previously explained, there was a sudden drop in the incidence.

## METHOD OF CONDUCTING WORM-COUNT STUDIES

In conducting worm-count experiments a large number of individuals are registered in the communities selected for study, and their hemoglobin indices are determined with the Dare apparatus. In each community a representative group is then chosen for treatment and further study. This group usually consists of twenty-eight or thirty persons, two thirds of whom are adults over fifteen years of age and one third children from eight to fifteen. Records for each individual give the name, age, sex, occupation, and hemoglobin index; whether or not the spleen is palpable; whether there has been previous malaria or previous anthelmintic treatment; and the results of the preliminary microscopic examination of the stools for hookworm ova.

The first treatment administered to a patient is termed the trial treatment. It varies according to the factors that are to be studied. Ten or fifteen days after the trial treatment, the test treatment is given to remove all of the hookworms that have remained after the trial treatment. An interval of this length should be allowed for the thorough excretion of the medicine administered in the trial treatment. The test treatment is always the same. It consists of a saline purge given at 8 p. m., followed the next morning by 3 mils of chenopodium administered in three equally divided doses, the first at 7, the second at 8, and the third at 9 o'clock. A final purge is given at 10:30 a. m. For children the dose of chenopodium is reduced to 1.5 mils in three equally divided portions.

To facilitate identification and to avoid confusion in handling the stools, each patient who has been treated is tagged on the wrist with a number and receives a chamber-pot which bears the same number. During the treatment careful entry is made of the hour of administration and the amount of the purge, the dosage of the anthelmintic, and the time of treatment. All symptoms, however trivial, are recorded. The entire stools are saved in the numbered chamber-pot for twenty-four hours after treatment, when the patient is given a second pot in which he saves his stools another twenty-four hours. The stools are carefully washed through No. 40 copper gauze on the day when they are received, and all the worms are picked out, counted, and classified.

# III

# HOOKWORM CONTROL

There are at least two means by which treatment for hookworm disease may be made more readily available to the many million inhabitants of tropical and subtropical countries who are under the burden of a heavy hookworm infection: preliminary microscopic examination can be omitted in regions of heavy infection; and an efficient treatment can be administered as a routine, with the expectation that effective sanitation and post-campaign treatment will eliminate whatever light infection remains.

**Impracticability of Insisting Upon Absolute Cure.** Large numbers of worm-count studies conducted by Darling and Smillie have shown that two standard treatments (1.5 mils each) of oil of chenopodium remove an average of 95 per cent of the hookworms harbored, and that three treatments remove an average of 98 to 99 per cent of all worms. Further medication to remove the few worms that remain after two or three treatments is hardly worth the effort. Moreover, since it has been shown that diagnosis by microscopic examination fails in about 50 per cent of lightly infected cases, it is difficult to determine accurately whether any worms remain in infected persons who have taken two or more treatments. In view of these facts, several countries have adopted modified working methods to accelerate the rate of treatment.

**Experimental Plan of Control for Ceylon Estates.** More than 99 per cent of the Tamil laboring population of Ceylon are infected with hookworms. Preliminary fecal examination is therefore omitted in the case of all except 10 or 20 per cent of the laborers on each estate. If the specimens obtained show over 80 per cent infection, the whole labor force, except persons less than a year old, those physically unfit for treatment, and pregnant women beyond the third month, are given one or two medium doses of chenopodium with an interval of one week between. All are examined clinically beforehand to be sure that they are fit to take treatment. Ten days after the first or second treatment, fecal specimens are obtained from all those who have been treated. Persons whom the microscope indicates to be positive after two treatments are given a third treatment.

**Modified Control Program in Trinidad and Papua.** In certain rural districts of Trinidad where the population is so widely scattered that an intensive campaign would of necessity make its way very slowly, a modified control program has been put into operation for the purpose of rapidly reducing mass infection. A treatment center is established in each district, a census is made of the entire population, and all persons are given one microscopic examination. Those

Fig. 55.—Staff for the relief and control of hookworm disease in Siam. Grouped at the entrance of the temple of Sankampang. Director Barnes stands fourth and Major Luang Boriracksha, a prominent figure in health work in Siam, fifth from the left of first row

Fig. 56.—Lecture on hookworm disease for plantation laborers, Colombia. Field director exhibiting chart on porch

found to harbor hookworms are urged to report for treatment at the community center. Four treatments are administered to each individual. No re-examinations are made, since previous experience in Trinidad has shown that four treatments (thymol is the drug commonly employed) cure 98 per cent of all patients treated.

In Papua, also, a special plan of work has been developed for extending control measures rapidly throughout the island. At the time of the initial survey of each estate an adequate number of sanitary latrines are installed and all laborers are given one treatment. The staff then moves on to the next estate, leaving a supply of anthelmintics in charge of a responsible person, who is commissioned to administer treatment systematically to all natives twice a year. It is believed that this plan will succeed in reducing mass infection, and that subsequently more intensive methods may be applied.

**Modified Working Plan Tentatively Adopted for Brazil.** In Brazil, too, where more than ten million people, scattered over a vast and sparsely settled area, are awaiting treatment, conservative modification has been made of the plan originally followed. This modified procedure involves a census of the community; one, and only one, microscopic examination of all persons;[1] and two treatments of oil of chenopodium administered with an interval of ten days to each infected person. Individuals with hemoglobin below 60 are treated three times without additional microscopic examination, unless malaria is a controlling factor in the anemia. In addition, all persons suffering from any form of intestinal helminthiasis whatever are treated once, as well as all the members of any family which contains even one infected individual. It is believed that this plan will reach all infected persons and succeed in eliminating at least 95 per cent of the intestinal parasites they harbor. Systematic effort is made during the treatment campaign to secure the construction of latrines at all the homes and to bring the people to understand the importance of using them as a safeguard against re-infection.

**Treatment Inadequate as Sole Means of Control.** Experience in many parts of the world has demonstrated that hookworm disease cannot be effectively controlled by treatment alone; if the benefits are to be other than transitory, treatment must be preceded or accompanied by adequate precautions against re-infection. This fact has been forcefully demonstrated in Ceylon, Trinidad, St. Vincent, Nicaragua, and various other countries in which control measures have been carried out. Between the years 1904 and 1910 approximately 288,000 Porto Ricans were treated for hookworm disease by the Anemia Commission under Ashford, King, and Guiteras, and striking benefits were conferred over vast areas, but there is still a high incidence of infection in Porto Rico because much

[1] In some sections of Brazil, where, as in Ceylon, there is a uniformly high rate of infection, preliminary microscopic examination is dispensed with, and treatment is carried out on the assumption that all persons are infected.

had to be done in the way of preliminary education before sanitary measures could be introduced.[1]

The history of hookworm work in the republic of Colombia illustrates anew the necessity of accompanying hookworm treatment with preventive measures. Since 1895, spasmodic efforts have been made to relieve the infection through treatment, but they have proved at best merely palliative because of failure to insure the use of latrines. The survey conducted during 1920 brought out the fact that among persons previously treated the infection rate was still 81.7 per cent, as compared with the rate of 76.9 per cent for the general population irrespective of whether they had been previously treated. Treatment of the people is worth while as a means of reducing mass infection and as an educational feature that may be expected to lead to the provision and use of sanitary conveniences; it is inadequate, however, as the sole measure of control.

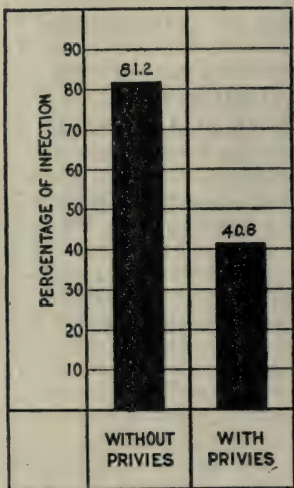


Fig. 57.—Rôle of latrines in controlling hookworm disease. Comparative incidence (based on examination of 8,465 cases) of the disease among users and non-users of latrines. Colombia

**Spread of Disease Through Lack of Latrines.** In Colombia, despite the fact that intermittent efforts to stamp out the disease had been going on for twenty-five years, more than 95 per cent of the rural homes were found, at the time of the 1920 survey, to be without latrine accommodation. Even in the larger towns—with the exception of Bogotá—there was no established system of night soil disposal: each householder was left to follow his own devices and many of them made not even the slightest pretense at sanitation. The feculent soil that results from such conditions forms, as one would expect, a constant menace to the public health. Of a total of 8,465 persons examined during the progress of the survey, it was found that only 646, or 7.6 per cent, were in the habit of using latrines. Among these persons the rate of hookworm incidence was only 40.8 per cent, as compared with the rate of 81.2 per cent among persons who did not use latrines (Fig. 57). Similarly, the survey of

[1] Through inadvertence, the Fifth Annual Report of the International Health Board, and lithographed report No. 7525 by Dr. John B. Grant, entitled *Hookworm Infection Survey and Malaria Survey of Porto Rico*, did not pay due tribute to the effective work of the early Porto Rico commission. Advantage is taken of this opportunity to correct the omission.

Fig. 58.—Sanitary latrines just completed under supervision of Jefferson county health department. Suburbs of Port Arthur, Texas (see Fig. 59)

Fig. 59.—Insanitary condition of alleys and yards in suburbs of Port Arthur, Texas, before Jefferson county health department began work (see Fig. 58)

Santa Catharina showed that only 57 per cent of the persons who regularly used latrines were infected with hookworm disease, as compared with 87 per cent infection among the persons who did not use them.

None of the numerous tea estates visited in Madras presidency, India, were found to be provided with latrine accommodations for their laborers. Soil pollution was general on all of them and accounted in large measure for the almost universal infection among the laborers. Similarly, in rural districts lying along the littoral of Brazil, where practically all of the people are infected, it is a rare thing for the homes to be provided with latrines. Of 2,875 rural homes inspected in the district of Jacarepagua, located only fifteen miles from the Federal capital, 78 per cent were found to be without latrines at the beginning of control work; and reports from São Paulo, Paraná, Santa Catharina, and other states show similar conditions. In the town of Guaratuba in the state of Paraná, with 600 inhabitants, there was only one latrine, of the pit type. Of 1,423 homes inspected in the municipality of Aguas Virtuosas in the state of Minas Geraes, 88.5 per cent had either no privies or privies inadequate for preventing pollution of the soil.

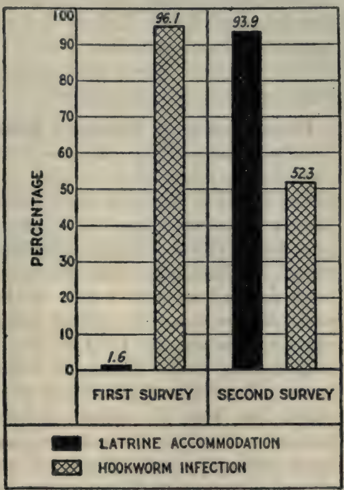


Fig. 60.—Effectiveness of latrines in preventing spread of hookworm infection, Central Mahé area, Seychelles Islands. Compare incidence of infection in first campaign, when there were few latrines, with that in second campaign, when latrine accommodation was almost adequate[1]

**Recent Survey of Panama and Colón.** The important rôle of sanitation in the control of hookworm infection was well brought out by work conducted during 1920 among school children in the cities of Panama and Colón. In type of soil, in elevation, and in climatic conditions these cities do not differ from the rural regions surrounding them, nor are the habits of their people essentially unlike those of their rural neighbors. From the standpoint of hookworm infection the fundamental difference lies in the fact that since the American occupation in 1904 the cities have had a modern system of sanitation.

[1] The fact that latrines are erected does not guarantee that they will be regularly used. Non-use of latrines on the part of some of the population, or failure to erect the latrines soon enough after treatment in the first campaign, may account for the 52 per cent infection recorded in the second campaign.

Two thousand twenty-one (2,021) children were examined for hookworm disease in these cities. Of these, only 608, or 30.1 per cent, were found infected. This is in striking contrast to the rate of 99.2 per cent established during the past two years by the examination of 8,791 children in interior sections of the republic, where sanitation practically does not exist. When all children who had resided in or visited rural regions were excluded from the city statistics, there remained only 229, or 11.3 per cent of those examined, who had apparently acquired their infection within the city limits. This rate is 88.6 per cent lower than that which obtained among children in other sections of the republic.

**Importance of Advance Sanitation.** Nowhere has the effectiveness of adequate preliminary sanitation been better demonstrated than in the mines of Australia. Experience with hookworm disease in the mines of America and Europe had caused apprehension lest the deep and warm mines of southern Australia had similarly become infected. The Australian mines present conditions of soil, temperature, and humidity that are favorable for hookworm disease, and have derived at least a part of their labor force from regions of the earth where mine or surface infection is known to exist. Yet the examination during 1920 of over four thousand miners and mine employes in South Australia, Victoria, and New South Wales failed to reveal a single case of hookworm infection. The principal factor which has kept the mines of Australia free from hookworm is the precautions which the mine management and the miners themselves have taken to guard against soil pollution. A system of pail latrines, placed in use when the mines were first opened, has ever since been cleanly maintained and regularly used.

**Government Interest in Advance Sanitation.** In practically all countries where work is now under way it is not difficult to secure the installation of sufficient latrines, usually in advance of treatment. The next step—to secure and enforce a system of inspection to guarantee their continued use—is less easy. This remains after three years the outstanding problem of the work in Ceylon. The movement for advance sanitation that originated in that colony in 1917 is now making itself felt in Australia, the Seychelles, Papua, the West Indies, Central America, and Colombia. In British Guiana a budget of $100,000 annually for a period of five years has been voted for sanitary improvement and a large part of this will be spent in sanitating areas in advance of hookworm treatment; in Trinidad, £50,000 of a new £1,000,000 bond issue has been allotted for sanitation; in Grenada satisfactory sanitary work is in progress; and in Jamaica and Porto Rico definite provision has been made for preliminary sanitation and for co-operation in control measures. In all countries the practical sanitary work demanded in the hookworm control demonstrations is resulting in the upbuilding of permanent sanitary agencies.

Fig. 61.—Excellent sanitary conditions have prevented hookworm disease from gaining a foothold in the mines of Australia. View of interior of change house, South Mine, Broken Hill, New South Wales

Fig. 62.—Surface latrine showing pails for use underground. Zinc Corporation Mine. Australia. Latrines are used by all employes, underground and surface

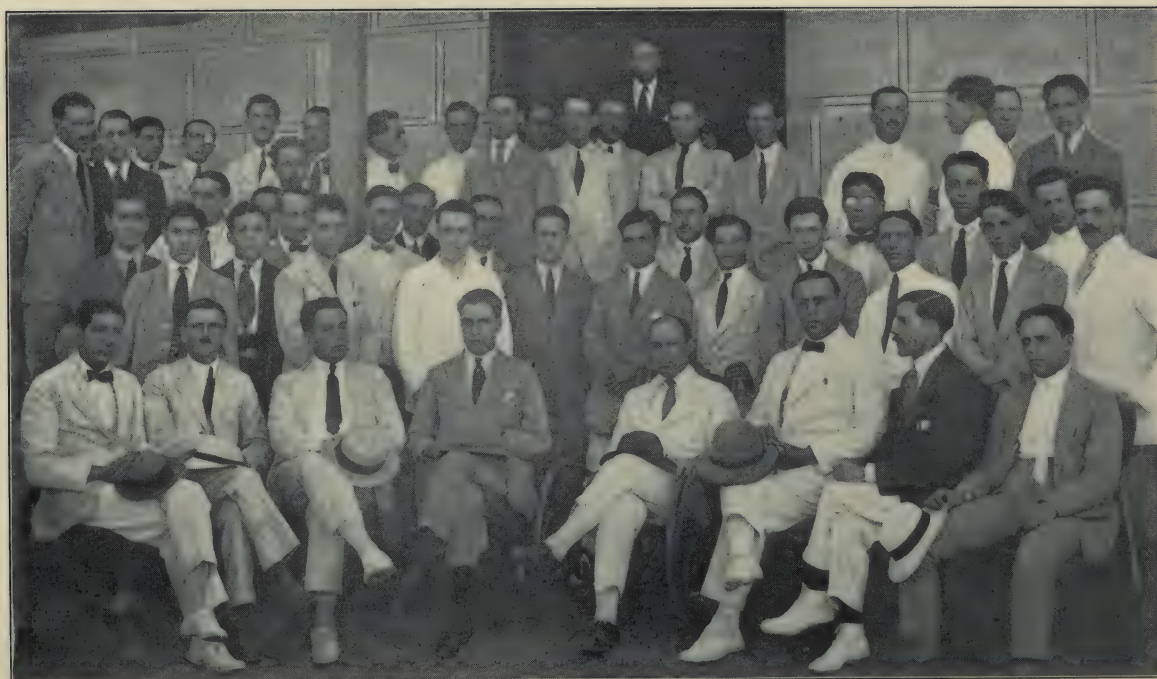

Fig. 63.—Department of Soil Sanitation, Republic of Colombia

**Advance Sanitation in Colombia.** Colombia is now making striking progress in securing the installation and use of latrines in advance of the carrying out of further hookworm examination and treatment. At the beginning of operations, June 14, 1920, only 3 per cent of the 51,911 homes inspected were provided with latrine accommodations of any description; on December 31, 1920, about 50 per cent of these homes were provided with satisfactory conveniences. The total latrines erected during the six-months period numbered 25,246. The plantations made an especially good showing in latrine building, many of them attaining a record of 100 per cent. Staff members were not sent to examine and treat the people in any area until all necessary latrines had been built. So ready, however, were the people to comply with the sanitary regulations that it was impossible to provide dispensary units rapidly enough to keep pace with the program of sanitation.

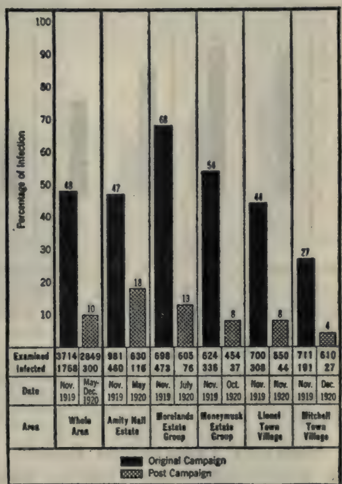


Fig. 64.—Reduction of hookworm infection on five estates of the Vere Area, Jamaica. Comparative incidence of infection in first and second campaigns

**Organization of Sanitary Department in Colombia.** The sanitary work in Colombia is entrusted to a permanently organized Government department vested with police powers. This division was created by special decree on February 5, 1920. Its personnel, consisting in June of two field directors and eight sanitary inspectors, had by October 15 been enlarged to include seven field directors and sixty-five sanitary inspectors. These men were divided into seven squads to operate in seven provinces, a sanitary inspector being assigned to each municipio (or district) of the province. Government makes latrine construction obligatory upon all proprietors of habitable houses. Failure to construct a latrine within twenty days after notification is punishable by a fine of from twenty to forty pesos. All members of the division have power to impose fines and to make them effective.

**Advance Sanitation in Central America.** In Nicaragua, at the close of the third quarter of 1920, the work entered definitely on a new phase—that of carrying out curative measures in areas where there had been advance sanitation. In the early work in this country preventive measures were out of the question. In the entire

area where curative work was under way at the close of 1920, 75 per cent of the homes had been provided with a good type of latrine at least six months in advance of the opening of the work. The area wherein operations will be conducted during the first six months of 1921 has already accomplished 90 per cent of privy construction.

In Panama, too, there has been developed a new plan of work whereby the entire staff will be concentrated in one province and sanitary construction will precede treatment. In Salvador the staff has endeavored so far as possible to precede relief measures by sanitary campaigns especially related to the construction of latrines. While progress in the latter country during 1920 has been somewhat slow, it has nevertheless been distinctly more encouraging than in former years. It is unfortunately still necessary to begin curative measures when only three fifths of the homes in an area are provided with latrines, but the provision of even three fifths of the homes with sanitary conveniences is a step in the right direction and the proportion may be increased as time goes on.

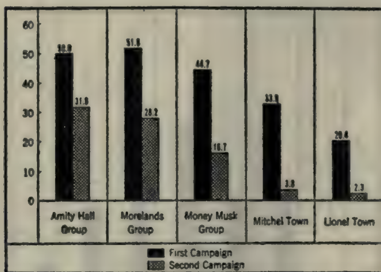


Fig. 65.—Reduction in severity of hookworm infection following control measures. Infected persons who required *more* than two treatments to cure, first campaign and second campaign compared. Five estates of Vere Area, Jamaica

**Sanitary Progress in Brazil.** Of the eighteen Brazilian areas in which co-operative control demonstrations were carried out in 1920, satisfactory sanitary progress is reported from only four: Jacarepagua in the Federal District, Guaratuba in the state of Paraná, and Itajahy and Florianopolis in the state of Santa Catharina. In the municipality of Jacarepagua all houses near small centers of population now have latrines. The only houses remaining unsupplied are scattered widely throughout the hills on the outskirts of the area. The intensive work in this district closed on June 30, but the sanitary work continues and a permanent force of sanitary inspectors will be maintained indefinitely. By the end of 1921 it is hoped that all permanent habitations in the district will be provided with latrines of one type or another. In the state of São Paulo Government has adopted a sanitary code and will inaugurate at once active efforts to enforce it. Past progress here has been due mainly to the effort of owners of coffee farms, who, oftentimes in advance of the treatment campaign, have made provision for installing latrines.

**Reduction of Hookworm Infection.** With a view to determining the degree of success achieved by measures for the control of

Fig. 66.—Durable and efficient type of public latrine. Bucket system with concrete superstructure. Heneratgoda, Ceylon. (Note cooly scavenger at work)

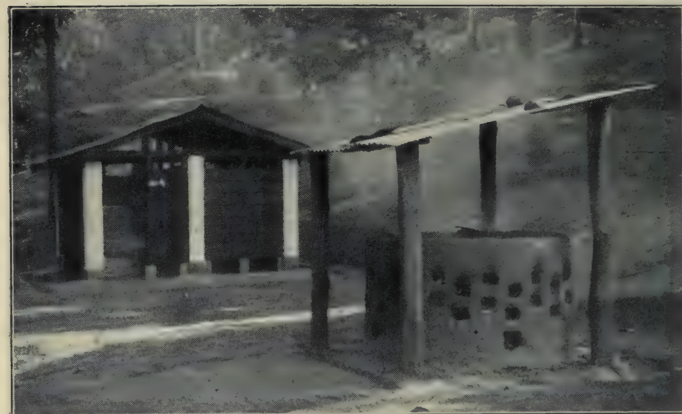

Fig. 67.—Well built pail latrine and incinerator. Ceylon

Fig. 68.—Excellent type of pit latrines for estates. Kept lighted at night. Ceylon

hookworm disease, re-surveys have been made from time to time of areas in which operations had been conducted in earlier years. The re-surveys conducted during 1920 in Jamaica and in the county of Escasú, Costa Rica, showed that control operations had effected substantial reductions in the incidence of the disease. On the Vere Estates in Jamaica, at the time of the original campaign in November, 1919, the rate of infection was 48 per cent; at the time of the re-survey in 1920 it was only 10 per cent (Fig. 64, page 169). The infection rate in the county of Escasú was 59 per cent in 1917; in 1920 re-examination of ninety-three persons whose treatment had been completed three years earlier showed an infection rate of 32 per cent—a reduction of 27 per cent.

Twelve representative counties of four southern states were also re-surveyed in 1920. The statistics indicate that the average infection rate of 59.7 per cent which prevailed at the time of the initial survey in 1911 had been reduced to 21.7 per cent at the time of the re-survey in 1920—a reduction of 38.0 per cent (Fig. 25, page 113).

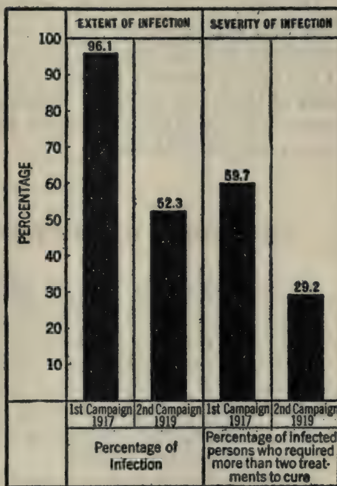


Fig. 69.—Reduction of infection in Seychelles Islands. Incidence of infection in first and second campaigns compared. The lightness of the infection in the second campaign will be seen by comparing the two bars to the right, which indicate the percentage of infected persons who required more than two treatments

Persons found on a second survey to be re-infected with hookworms harbor a much smaller number of worms than they harbored at the time of their first treatment. Of 286 re-infected persons treated during the second campaign on the Vere Estates in Jamaica, 78 per cent were freed of worms by two treatments, and in not a single instance were more than four treatments necessary (Fig. 65). In the first campaign in this area, on the other hand, the treatment of only 58 per cent of the patients was completed by two treatments, and in some cases it had been necessary to give as many as ten treatments. In the Seychelles Islands, again, 70.8 per cent of the total number of persons freed of worms in a re-campaign were relieved of their infection by two treatments, as compared with only 40.3 per cent in the first campaign one and one-half years earlier (Fig. 69).[1]

[1] All of these re-survey figures are based on search with the microscope for eggs in the feces.

# IV

# DIAGNOSIS AND TREATMENT OF HOOKWORM DISEASE

Hookworm infection may be diagnosed by administering a vermifuge and searching the stools for hookworms, or by omitting the vermifuge and microscopically examining specimens of feces for ova. It has been customary in field work to rely almost wholly upon variations of the latter method. There are culture methods by which the presence of the infection may be demonstrated, but these are hardly practicable for field use.

## DIAGNOSIS BY MICROSCOPIC EXAMINATION

In areas where less than 85 per cent of the people are infected, it is desirable, before administering treatment, to determine whether the infection is present by microscopically examining the feces. Several means of making the examination have been developed, of which the simplest is the plain smear method. This consists of mixing on a two-by-three-inch slide a small portion of fecal matter with a few drops of water, and examining by low power magnification three films made from the mixture.

A more accurate diagnosis can be made with the aid of the centrifuge. When this method is used, a portion of the fecal specimen is thoroughly stirred in a metal cone with five times its volume of water and allowed to settle for a few minutes. Then the supernatant fluid, with ten times its volume of water, is poured into a centrifuge tube and centrifuged rapidly for five minutes. At the end of this time slides for examination with the microscope are prepared from the deposit on the cork of the tube.

**Methods of Detecting Ova in Lightly Infected Specimens.** Both the plain smear and the centrifuge method, though reasonably dependable when large or moderate numbers of hookworms are harbored, fail to diagnose accurately a considerable proportion of light infections. The need for a microscopic technique which would succeed where these fail has led to the development of a number of methods which secure the concentration of a large number of ova on a slide.

*a. Lane levitation method.* Clayton Lane recommends a technique which he designates as the levitation method. In this procedure the concentrated sediment of a centrifuged specimen is transferred to a

glass slide, where it is mixed with one mil of water. The slide is allowed to stand for five minutes and is then immersed in water and manipulated until all coarse matter has floated free. The hookworm ova stick firmly to the slide and are not washed away. Lane reports that on an average this method results in a ten-fold concentration of ova.

*b. Glycerine-salt method.* Barber in the course of his work in the Federated Malay States developed what is known as the glycerine-salt method of examination. In this the fecal specimen is diluted with a fluid composed of equal parts of glycerine and a saturated solution of magnesium sulphate. The mixture is thoroughly stirred and broken up with a toothpick, a process which releases the hookworm ova and causes them to rise to the surface. When the upper part of the fluid in each container is placed on a slide, a large number of ova are brought under the lens of the microscope.

*c. Brine flotation-loop method.* Kofoid and Barber during their work with the United States Army achieved good results with the brine flotation-loop method of examination. This process demands that a large fecal sample be thoroughly mixed with concentrated brine in a paraffin paper container of from fifty to seventy-five mils (two to three ounce) capacity. The coarse float is forced below the surface by means of a disk of steel wool, and the container is allowed to stand one hour. The upper film is then lifted off with a wire loop one-half inch in diameter and transferred to a slide for examination. The great advantage of this method is believed to lie in its easy utilization of large samples. It eliminates to a large extent the element of random sampling and insures a sufficient number of ova on the slide to make detection possible even when the infection is so light that the ova would be overlooked by other methods using smaller samples.

*d. Willis levitation technique.* Willis has developed a simplified levitation method which requires no apparatus other than the microscope. This procedure calls for the removal, from the tin in which the fecal specimen has been collected, of enough of the specimen to leave the container not more than one-sixth full. A saturated solution of coarse table salt is then added drop by drop to the specimen until the container has been filled to the brim. The mixture is thoroughly stirred and allowed to stand for a few minutes to permit the ova to rise. A clean polished slide is then placed on the container in contact with the surface of the fluid. In a short time the ova adhere to the slide, which is then removed and placed under the microscope for examination. The advantage of this method lies in its rapidity and in the fact that it secures a good concentration of ova with the use of a small specimen—a factor which makes it suitable for use in field work, especially in remote districts where specimens have to be carried on horseback for many miles.

## DIAGNOSIS BY ADMINISTRATION OF VERMIFUGE

The most accurate method of diagnosing hookworm infection is by administering vermicidal treatment and examining the stools for worms. This method is of especial value for determining both the type and the number of hookworms harbored. It is not, however, practicable as a routine field measure. To diagnose infection by this method, it is customary to administer treatment according to the routine method and to save all stools passed by the patient for the succeeding seventy-two hours. The patient should be restrained from eating vegetables with coarse fibres during this period, as these, when passed with the stools, may interfere with the search for worms.

**Method of Washing Stools.** A regular routine is followed in washing the stools. Those that are soft or fluid are washed at once; the more compact stools are mixed with water and stirred until soft. The washing is done by means of a jet of water played with moderate force into a large brass wire sieve (mesh fifty to an inch) into which the feces have been poured. The washed stool is distributed into photographic developing trays, a small portion into each tray. A dark brown tray furnishes the best background for the worms. The worms are then picked out with needles or with forceps and placed in properly numbered Petri dishes containing normal salt solution. Later the excess salt solution is drained off, and the worms are killed by flooding the dishes with boiling alcohol (70 per cent). After the worms are scalded, they become rigid and assume shapes that are characteristic of their species. This renders differentiation comparatively easy and permits rapid counting of the worms.

## TREATMENT OF HOOKWORM DISEASE

Chenopodium is now the definitely preferred anthelmintic for treating hookworm disease. However, it sometimes has an injurious effect upon persons to whom it is administered. Alarming symptoms, and on rare occasions deaths, have been reported from various areas following the administration of the drug in accordance with accepted methods of treatment. Children are especially susceptible to its toxic qualities. Of ten fatalities from chenopodium reported in Brazil during the Board's four years of work in that country, all but one occurred among children ten years of age or less. In Colombia during 1920 seven deaths, all of which were among children, occurred after treatment with chenopodium. It is essential, therefore, that medical officers exercise careful supervision over the use of the drug in the field and that they prescribe for children a dosage smaller than is indicated by Young's rule.

**Standard Method of Administering Chenopodium.** The standard method of administering chenopodium in field work is that

Fig. 70.—Demonstrating the actuality of hookworms to native peoples. Group awaiting turn to view the worms with the microscopes. Sankampang, Siam

Fig. 71.—Training microscopists for field work. La Mesa, Colombia. Hookworm control operations were inaugurated in this country during the year

recommended by Darling and Smillie as a result of investigations in the Federated Malay States and in Brazil. It consists of an adult dose of 1.5 mils administered in freshly filled hard gelatine capsules. The drug is given in two equal portions, one at 6 a.m. and one at 8 a.m. The last capsule is followed in two hours by a saline purge. No preliminary purge is given. The patient is allowed no food from 8 p.m. of the day preceding treatment until after the prescribed medication has been administered and the purge has acted well. At 7 a.m., however, a small cup of black coffee may be permitted. For children the dosage of chenopodium is graded according to age: those between five and eight years receive one drop of the vermifuge for each year of age; those over eight years are given two drops for each year. The dropper employed is so graded that thirty drops equal one mil.

In the Brazilian experiments one treatment according to this method was found to remove 83 per cent of all hookworms present, and two treatments approximately 95 per cent. The treatment is easily and cheaply administered and produces very little discomfort.

**Efficiency of Chenopodium in Undivided Doses.** Darling and Smillie found that in so far as single treatments were concerned, the best results were obtained when chenopodium was administered in an undivided two-mil dose, preceded by a saline purge on the evening before treatment and followed two hours after treatment by a similar purge. With this technique 93.8 per cent of the worms harbored were removed by one treatment. Under hospital or dispensary conditions this technique may be employed as easily and as cheaply as the standard method recommended for field use. It causes less discomfort to the patients than other methods, and by its provision for the rapid elimination of the drug it entails less danger of toxic symptoms. It is not, however, adapted to field conditions, especially in sparsely settled rural communities where the administration of a preliminary purge is a difficult and expensive procedure.

**Omission of Preliminary Purge with Oil of Chenopodium.** Many authorities hold that better results are obtained from chenopodium if a pre-treatment purgative is given. The field experiments of Darling and Smillie, however, have indicated that a preliminary purge, instead of adding to the efficiency of a divided 1.5-mil dose of chenopodium, *slightly* diminishes it in the case of adults. This dosage preceded by a purge was found to remove 90.7 per cent of the worms present, whereas without the preliminary purge it removed 91.0 per cent of all worms. There was relative failure of treatment[1] in 35 per cent of the cases receiving a preliminary purge and in 21 per cent of the cases not receiving one. When smaller doses of chenopodium were given, as in the treatment of children, preliminary purgation *greatly* lowered the efficiency of the drug. A dose of .6 mil preceded by a purge removed only 70.6 per cent of the worms har-

[1] In these experiments a treatment was considered to have failed if it left the patient with ten or more worms.

bored; with preliminary purgation omitted it removed 85.6 per cent. Treatment failed in 100 per cent of the cases receiving a preliminary purge and in only 33 per cent of those not receiving the purge.

When a preliminary purge is administered under field conditions, it frequently so weakens the patient as to unfit him for work the next day, thereby greatly prejudicing him against treatment. Often it causes extreme prostration. In sparsely settled areas its administration is difficult and almost doubles the cost of treatment. It seems advisable therefore to omit preliminary purgation in field work. This was done during 1920 in Brazil, Ceylon, Australia, Salvador, and Guatemala. In none of these areas were there any ill effects or any decrease in the percentage of cures.

**Effect of Preliminary Abstinence from Food.** Authorities as a rule advise a very light diet during the twenty-four hours preceding treatment. Theoretically, abstinence from food for from fifteen to twenty hours before chenopodium administration should, by leaving the intestinal tract empty, greatly enhance the efficiency of the vermifuge. Field experiments conducted by Darling and Smillie, however, have shown that by far the best results from the chenopodium are obtained when patients are allowed their usual diet on the day before treatment but no food on the morning of treatment. When this procedure was followed and the preliminary purge omitted, 91.0 per cent of the worms harbored were expelled by one treatment (1.5 mils). When patients were allowed no solid food after 11 a.m. of the day before treatment and no nourishment of any kind after 5 p.m., and when the preliminary purge was omitted, one treatment removed 90.1 per cent of all worms. Among persons from whom food was withheld, treatment failed in 60 per cent of all cases, while among those who received an ordinary diet on the day before treatment, there were only 21 per cent of failures. Moreover, prostration and severe toxic symptoms were universal among persons who did not receive food.

In the case of children, who received small doses of the drug, only 35.6 per cent of all worms were removed when food was withheld, and there were 100 per cent of treatment failures; among children who were allowed an ordinary diet, 85.6 per cent of all worms were expelled and there were only 33 per cent of treatment failures.

In field work conducted in Ceylon and the Seychelles Islands, also, it was found that patients who ate an ordinary meal on the afternoon before treatment were much less apt to suffer collapse after the administration of chenopodium than those who were limited to a light repast. Furthermore, there was no diminution in the percentage of cures when a regular diet was permitted.

**Simultaneous Administration of Food and Chenopodium.** A series of experiments were made by Darling and Smillie during 1920 to determine the effect of administering food coincidently with chenopodium. Patients undergoing this test were subjected to no

Fig. 72.—Group of village headmen assembled to hear a lecture on hookworm disease. Ceylon

Fig. 73.—Eager listeners to chart lecture at Parnassus Creole Barracks. Jamaica

diet restrictions on the day before treatment and received no preliminary purge. On the morning of treatment they received .75 mils of chenopodium at 6 a.m. Between 6:30 and 7 a.m. they were allowed 250 mils of milk, 100 mils of coffee, and 200 grams of bread. At 8 a.m. they received a second .75-mil dose of chenopodium and at 10 a.m. a saline purge. This procedure caused no toxic symptoms nor even the mild discomforts which usually attend treatment with chenopodium, but it greatly lowered the efficiency of the drug. It removed only 56.2 per cent of all worms harbored and failed in 58 per cent of the cases treated.

**Magnesium Sulphate Most Commonly Used Purgative.** The question as to the best purge for use in connection with hookworm treatment has not been definitely settled. The one most extensively used is magnesium sulphate. The rapidity of action of this purgative has been found to vary in inverse proportion to its concentration. Experience in Ceylon has shown that when a strong solution is administered, catharsis is often delayed until evening of the day of treatment, or even until the next morning. A weaker solution (two pounds of salt to a gallon of water, or about one and one-half drams to the ounce) gives much prompter action and is less apt to cause griping or collapse. The most satisfactory dosage of this weaker solution of magnesium sulphate appears to be two and one half ounces for adult males and two ounces for adult females.

**Compound Jalap Powder an Efficient Purge.** Washburn reports that in his recent work in Jamaica he used compound jalap powder with much success as a substitute for magnesium sulphate. The drug was given in capsule form, both as a preliminary purge and coincidently with the vermifuge. For the preliminary purge it was mixed with a small amount of powdered charcoal and administered to adults in doses of thirty to forty grains.[1] In the treatment capsule it was compounded with thymol in the same manner and same amounts as milk sugar or bicarbonate of soda. When chenopodium was used, the jalap was placed in the capsule and the oil was dropped upon it. As a preliminary purge, compound jalap powder does not act so rapidly as magnesium sulphate; it can therefore be given on the afternoon instead of the evening preceding treatment, and the nurse is saved the necessity of visiting his patients at night. A final purge is not required when jalap is added to the treatment capsule, and an extra dose of purgative is not found necessary in so many instances as when a single dose of magnesium sulphate is given after vermifuge treatment. The powder is cheaper than magnesium sulphate, easier to administer, and not disagreeable to take.

**Castor Oil Used Successfully with Chenopodium.** Many authorities have found castor oil a satisfactory purge for use with

[1] The powdered charcoal was mixed with the jalap used in the capsule given for the preliminary purge in order to darken the capsule and thus render it easily distinguishable from the treatment capsule of thymol and jalap.

chenopodium. Salant's experiments showed that the resistance of animals to the toxic effect of chenopodium was much greater when the drug was preceded by a dose of castor oil. Quantities of chenopodium which invariably caused the death of animals when administered without castor oil, were received without symptoms of poisoning when the oil was given shortly before or after the vermifuge. Hall and Wigdor in their experimental treatment of 220 dogs found that when castor oil and chenopodium were administered simultaneously, good purgation was obtained and a high degree of protection was secured against gastro-intestinal irritation and the toxic effects of the vermifuge.

In Nicaragua during 1920 Molloy compared the cases receiving magnesium sulphate after chenopodium with those receiving castor oil. The latter group experienced practically no serious after-effects; in the former, severe symptoms were common. Persons suffering from inanition frequently experienced extreme prostration after taking magnesium sulphate. Following these observations Molloy administered, to all hookworm patients who showed evidence of severe debility, castor oil before, with, and after chenopodium. In less extreme cases of debility he administered chenopodium in half an ounce of castor oil, and gave a small dose of magnesium sulphate two hours after the last dose of vermifuge. Furthermore, he gave a dose of castor oil immediately to all persons who presented symptoms of poisoning following treatment with chenopodium.[1] No serious cases of poisoning occurred after the institution of these measures.

**Standard Technique of Thymol Administration.** In the countries where thymol is used, the dosage most commonly employed is that recommended by Stiles, Dock, Howard, Bass, and others of wide experience in the treatment of hookworm disease. It is based upon sixty grains as the maximum for an adult, preceded and followed by an active saline purgative. Children from one to five years of age receive from three to five grains of the thymol; those from six to ten, from ten to fifteen grains; and those from eleven to fifteen, from fifteen to thirty grains. Persons between sixteen and twenty years of age receive from thirty to forty grains; those between twenty-one and fifty years, from forty-five to sixty grains; and those more than fifty years, from thirty to forty-five grains. The drug is usually administered in finely powdered form, mixed with equal parts of milk sugar or sodium bicarbonate. It is given in two equal portions, and apparent—not actual—age determines the dosage. Competent physicians examine all patients who are to take the drug, prescribe

[1] It is worth noting, however, that Darling, Barber, and Hacker have reported an experience directly the opposite of that indicated by Salant's, Hall and Wigdor's, and Molloy's results. In their investigations in the Orient they found that when castor oil was used with chenopodium, there was a noticeable increase in dizziness, deafness, and other toxic symptoms, as compared with the symptoms that resulted when magnesium sulphate was used.

the proper dosage for each, and supervise the important phases of treatment.

**Conditions Governing Administration of Thymol.** Food is not allowed from the time of the first purgative until after the final dose of salts has acted. Inasmuch as alcohol and oils, and gravy, butter, milk, and other fatty foods, are especially dangerous, the patient is cautioned against taking them at any time during the period of treatment. Under field conditions it is generally held that thymol should not be administered to persons suffering from acute diseases, such as malaria in the febrile stage or fevers of any other type; to those having chronic dysentery or diarrhea, organic cardiac or renal disease, pulmonary tuberculosis beyond the incipient stage, or general anasarca; to those who are extremely weak or feeble from old age or from other cause; or to pregnant women or women with serious hemorrhagic diseases of the uterus. Thymol may be administered to persons suffering from any of these diseases only when the circumstances will permit rigid control of all features connected with the treatment.

# V

# OPERATIONS AGAINST YELLOW FEVER

During 1920 co-operative work against yellow fever was undertaken in Mexico; aid was given in the suppression of epidemics in Central America, in Brazil, and in Peru; sanitary surveillance was maintained to guard against a recurrence of the infection in Guayaquil, Ecuador; and the presence of the disease in West Africa was investigated. Work against yellow fever was therefore under way in every region in which it is known to exist, and steady headway is being made toward its control.

**Mexico Undertakes Co-operative Anti-Stegomyia Campaign.** Upon invitation of Government a co-operative program for the control of yellow fever in Mexico was adopted toward the close of 1920. A decree issued by the President shortly after the arrival in Mexico City of Colonel T. C. Lyster, director of yellow fever work in Mexico and Central America, authorized the inauguration of control measures throughout the infected districts, provided for the creation of a special yellow fever commission, and set aside 50,000 pesos for carrying out the work. All control operations under the new plan are to center in the Mexican Department of Health. The American personnel will regard themselves as representatives of this department.

During the last six months of 1920 yellow fever existed in Mexico from Tampico to Progreso in the east, and from Hermacilla to Tapachula in the west. This epidemic was checked under the able direction of the national Board of Health. The first efforts under the new co-operative program will be directed toward the points of greatest importance. Late reports indicate that in the first area inspected, a zone 150 kilometers in diameter with Vera Cruz as its center, the incidence of the disease is low.

**Yellow Fever Eradicated from Guayaquil.** One of the outstanding features of the yellow fever situation in 1920 was the official announcement made in July by the Director of Health of Ecuador that the disease had been entirely eradicated from that country. The infection, which had been present in Guayaquil since 1842, was brought under complete control in that city in June, 1919. Since then no vestige of it has reappeared, and there is every reason for believing that it has been permanently suppressed (Fig. 74). With the disappearance of yellow fever from Guayaquil it is believed that the last endemic focus of the disease in Ecuador has been eliminated. A modern water-supply system is being installed in Guayaquil. Until such time as it is in operation, Government inspectors will guard against a recurrence of Stegomyia breeding by maintaining strict supervision of all water containers. On November 29, 1920, Govern-

ment assumed full responsibility for the continued maintenance of the work, and the Board's representative withdrew from the country.

**Reappearance of Yellow Fever in Central America.** In Central America outbreaks of yellow fever occurred during 1920 in Salvador and Guatemala. A few sporadic cases were reported in Nicaragua. In Salvador the disease was first detected in the coastal plain city of Sonsonate, where a large military detachment recruited from all parts of the Republic had been gathered to suppress a threatened revolution. Many of the recruits had come from high altitudes and were therefore non-immunes. Between May 22 and August 21 there were fifty-six known cases of yellow fever in Sonsonate. The city was placed under strict quarantine, but despite this precaution the disease spread to seven other towns in the department of Sonsonate, to the neighboring departments of Santa Ana and La Libertad, and to Usulután. Meanwhile, smoldering foci of infection which had existed in the city of San Salvador as an aftermath of the epidemic of 1919 flared forth, and the disease spread rapidly to many sections of the city. In the course of the year twenty-five localities of the country were visited by yellow fever, and 181 cases in all were reported (Fig. 75, page 188).

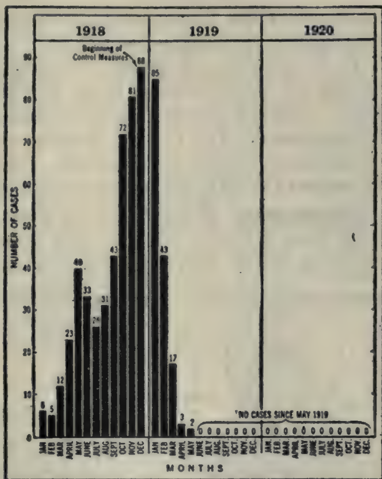


Fig. 74.—Incidence of yellow fever in Guayaquil, Ecuador, 1918–1920. The disease has been completely eradicated from that city as the result of anti-mosquito measures instituted there in November, 1918. Since May, 1919, there has not been a single case

In Guatemala the disease appeared in early June at Los Amates, whither it had probably been carried by an itinerant peddler from Sonsonate. Between June 5 and September 11 fifteen cases were reported. Later nine cases appeared in La Democracia, five in Zacapa, and one in Virginia.

**Control Measures in Central America.** The health authorities of Salvador and Guatemala at once put forth every effort to suppress these outbreaks, so that by the end of the year yellow fever had almost entirely disappeared from both countries. To insure protection against its recrudescence, anti-mosquito measures will be continued in every area of infection for at least a year after the ap-

pearance of the last case of the disease. Fish control will play a prominent part in these operations.

In Nicaragua and Honduras protective anti-mosquito work was carried on throughout 1920 to guard against outbreaks of yellow fever. During the coming year these precautionary measures will be continued. The Central American countries have taken a determined stand against yellow fever. It seems that their earnest efforts to control the infection must in the end win out.

**Suppression of Epidemic in Peru.** The elimination of yellow fever from Ecuador left only one center of infection on the Pacific coast of South America—the province of Piura in northern Peru.


Fig. 75.—Map of Salvador showing location of yellow fever cases in 1920 epidemic

An epidemic of the disease had broken out in that region early in 1919 and had spread to at least ten towns by 1920. The incidence of the infection and the death rate were high. Under the direction of Dr. Henry R. Carter, the Government health service organized energetic measures for the control of Stegomyia breeding throughout the area, and at length succeeded in reducing the Stegomyia index below the danger point. As a result yellow fever had disappeared from the province by the end of October, 1920.[1]

**Controlling the Infection in Brazil.** While measures were under way for eradicating yellow fever from the west coast of South

[1] In February, 1921, yellow fever reappeared in Peru at a point south of the region previously infected. The disease crossed the desert from Piura and broke forth in several of the rather densely populated coastal towns of the department of Lambayeque. The Board is co-operating with Government in control measures which are being conducted under the direction of Dr. Henry Hanson.

Fig. 76.—Colonel T. C. Lyster, of the Board's yellow fever staff, administering Noguchi yellow fever vaccine. Los Amates, Guatemala

Fig. 77.—Receptacles such as these were a favored breeding place of yellow fever mosquitoes at beginning of control effort in Guayaquil, Ecuador. Fish effectively prevented breeding in practically all these and other miscellaneous water containers

America, the public health service of Brazil was engaged in fighting the infection in the sections of that country where it still persisted. Early in 1919 epidemics of the infection had broken out in six of the northern states of the country. Government organized a central yellow fever commission for combating these outbreaks, and each state where the disease existed appointed a body with similar functions. The various measures which these organizations pursued for reducing the Stegomyia index throughout the infected regions resulted by the end of 1920 in yellow fever in epidemic form being entirely suppressed, and in endemic form being confined to the narrow strip of coastal area between Bahia and Pernambuco. Outbreaks of the disease which occurred in the states of Pernambuco and Sergipe during 1920 were soon controlled, and during the last four months of the year no verified cases were reported from any part of the Republic.

**Pursuit of Yellow Fever in Africa.** During 1920 a commission visited the west coast of Africa to investigate the nature of a disease which has prevailed in that region for some time and has frequently been reported as yellow fever. The commission, composed of R. E. Noble, M. D., Assistant Surgeon General of the United States Army; Juan Guiteras, M. D., Director of Public Health of Cuba; Adrian Stokes, M. D., Assistant to the Professor of Pathology, Trinity College, Dublin; A. E. Horn, M. D., of the West African Medical Service; and W. F. Tytler, M. D., of the staff of the Medical Research Council in Great Britain, arrived in Lagos, Nigeria, July 17. Here it established headquarters and opened a laboratory. From this point the members carried their investigations into Nigeria, Dahomey, the Gold Coast, Senegal, and Matadi in the Belgian Congo.

**Further Study Required to Determine Presence of Infection.** A study of such vital statistics and records of epidemics as were available in these localities indicated that yellow fever, or an infection closely allied to it, had existed endemically and epidemically for many years. For the period from May, 1915, to May, 1920, a total of eighty-six cases of yellow fever were reported in the British West African colonies alone. There were also records of epidemics in Dahomey at various times during the period from 1905 to 1917. In the Belgian Congo an outbreak was reported in 1917.

The commission remained in the West Coast area for a period of only fifteen weeks. During the brief time at its disposal it saw no authentic cases of yellow fever, nor was it able to observe any cases of a disease known locally as "shaura," which is reported to exist among the natives and to produce in its acute stages symptoms suggestive of yellow fever. To establish definitely whether this disease is or is not yellow fever, and whether, if it is not, yellow fever is present at all, will require a longer period of time and better facilities for investigation than the commission had at its disposal. Indeed, the task of tracking down yellow fever in this area is likely to prove

a most arduous one and to require prolonged local residence. It will involve following clues to the disease into native villages far from the coast and covering tremendous distances in sections where horseback, hammock, and walking are the only means of travel. The tendency of the natives to hide all cases of disease from the authorities will also complicate the problem. The commission has recommended that another body of investigators be sent to undertake this difficult study and to suggest definite measures for the suppression of the disease if it is found to exist.

**Use of Vaccine and Serum in Yellow Fever Control.** *Leptospira icteroides* was first isolated by Noguchi in 1918 from cases of yellow fever in Guayaquil. Later (1919) the organism was obtained from yellow fever cases in Merida, Yucatan, and again (1920) in northern Peru by Noguchi and Kligler. Gastiaburu transmitted yellow fever to animals in Piura in 1919. Perez-Grovas, working in Vera Cruz, Mexico, during the summer of 1920, reproduced yellow fever in guinea pigs and obtained a culture. Le Blanc, of the Rockefeller Institute staff, also obtained a strain of the organism from a case of yellow fever in Vera Cruz (1921). The strains obtained by Perez-Grovas and Le Blanc have been found to be identical with the *Leptospira icteroides* isolated earlier.

The killed cultures of *Leptospira icteroides* were first used for protective inoculation against yellow fever in Guayaquil in 1918, where 427 vaccinations were carried out. The results were so encouraging (the morbidity rate among vaccinated and unvaccinated during the same period being 11 and 110 per thousand, respectively) that a vaccine several hundred times as strong has been made in large quantities and employed in Mexico by Drs. Vasconcelos and Casasus of the Consejo Superior de Salubridad; by Drs. Lyster, Bailey, and Vaughn in Central America; and by Drs. Lynn and Guadarrama in Túxpan, Mexico. The total number of non-immune persons reported vaccinated is about 8,000. The development of protection, as in the case of other vaccines of this sort (anti-typhoid, for example), requires about ten days for completion, persons exposed to yellow fever just before vaccination or immediately afterwards not being protected by vaccination. Excluding such instances, however, there has been no case of yellow fever among the 8,000 persons vaccinated in the various localities, while among unvaccinated persons during the same period and in the same areas there have been about 700 cases of the disease.

The vaccine, by providing immunity, furnishes a rapid method for reducing the number of non-immune persons in areas where yellow fever is epidemic. By the application of sanitary measures to eliminate the mosquito carrier and of vaccination in the meantime to cut off from the infected mosquitoes the supply of non-immune material, a threatening epidemic of yellow fever in Guatemala and Salvador in 1920 is reported to have been checked within one month from the appearance of the first cases; that is, before a second set of cases had

developed. The value of vaccination as an emergency measure does not, however, minimize the importance of the anti-mosquito operations, the elimination of both factors—the non-immune human being and the infected mosquito—being useful in the control of yellow fever.

A therapeutic serum is also available for the treatment of yellow fever. It has already been employed in 152 cases by Drs. Lyster, Vaughn, and Bailey in Central America; by Drs. Vasconcelos and Casasus, Lynn, and Guadarrama in Mexico; and by Dr. Hernandez of the Junta de la Sanidad de Yucatan. Persons treated before the third day of illness have almost invariably recovered, the exceptions being those cases in which the quantity of serum used was too small to have any effect. After the fourth day of illness the injuries to organs are so great as to be irreparable in severe cases of yellow fever. By the use of the serum the usual mortality in yellow fever, 50 to 60 per cent, has been reduced to 9 per cent.

## VI

# COUNTY HEALTH WORK

In the Southern States demonstration campaigns in the control of hookworm disease have greatly stimulated the development of full-time county health organizations. These agencies seek to do for the rural people what the modern, well-equipped municipal health department does for the population of the larger towns and cities. The importance of this work will be appreciated when it is remembered that 54 per cent of the total population of the United States is rural, and that in twenty-five of the states the rural population comprises more than three fifths of the total.

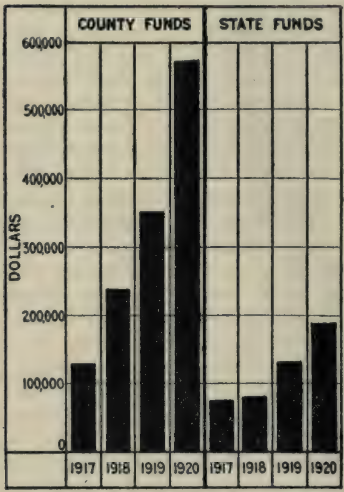


Fig. 78.—Increase in appropriations for county health work. Southern States, 1917–1920

Ninety-seven counties in twelve southern states had, at the close of 1920, full-time health departments. Interest in public health matters has been stimulated, the people are voting taxes as never before for health purposes, and a sanitary sense is beginning to manifest itself. The marked increase in state and county appropriations is exhibited in Fig. 78.

In one of the states county health work has been in progress for more than three years. At the close of 1920 work of this kind was being conducted in twenty-four of its counties having a combined rural population which represented 33 per cent of the state's rural population. A summary of the results accomplished in these twenty-four counties shows 28,345 persons examined and 5,469 treated for hookworm disease; 96,739 vaccinated against typhoid fever and 36,810 against smallpox; 13,670 cases of infectious diseases quarantined; 77,573 school children and 5,780 adults examined for physical defects; and 2,354 public health meetings held, at which the total attendance was 253,488. In addition, 23,547 privies at rural homes were either constructed anew or improved to meet the requirements of the state board of health.

**Monthly Report of ........County**
**to the**
**STATE BOARD OF HEALTH**
**February 1920**

**EDUCATIONAL**

| | |
|---|---|
| Public meetings | 10 |
| Attendance | 727 |
| Letters sent | 757 |
| News articles (original) | 5 |
| News articles (press) | |
| Office conference, hours | 8 |
| Pieces of literature | |

**SOIL POLLUTION**

| | |
|---|---|
| Sanitary privies, rural | 317 |
| Sanitary privies, towns | |
| Specimens, stools examined | 1 |
| Having hookworm | |
| Treatments given | |
| Cured of hookworm | 22 |
| Workers employed | |
| Days worked, total | |
| Water supplies improved | |

**SCHOOLS**

| | |
|---|---|
| Schools visited | 14 |
| Cards received | 793 |
| Children examined | 105 |
| Children treated | 2 |
| Sanitary privies installed | |
| Physical exam teachers | 2 |

**DISPENSARIES**

| | |
|---|---|
| Vaccinations, typhoid | |
| " smallpox | 305 |
| " whooping-cough | |

**CITY (Special)**

| | |
|---|---|
| Inspections, hotels, etc. | 6 |
| Dairy inspections | |
| Milk examinations | |
| Sewer connections | 3 |
| Special investigatons | 2 |
| Nuisances abated | |
| | |

**QUARANTINE**

| | | |
|---|---|---|
| Cases quarantined | | 81 |
| Whooping-cough | REPORTED | 13 |
| Measles-German Measles | REPORTED | 28/ |
| Diphtheria-S.S. throat | REPORTED | 1/ |
| Smallpox-Chickenpox | REPORTED | 7/29 |
| Typhoid-Para typhoid | REPORTED | 2/ |
| C.S.Meningitis-Inf. paralysis | REPORTED | |
| Trachoma-Ophthal. neonat. | REPORTED | |
| Venereal disease | REPORTED | |
| Scarlet fever | REPORTED | 1 |
| Influenza | | |
| Whooping-cough | VISITED | |
| Measles-German Measles | VISITED | 19/ |
| Diphtheria-S.S. throat | VISITED | 1/ |
| Smallpox-Chickenpox | VISITED | 6/13 |
| Typhoid-Para typhoid | VISITED | |
| C.S.Meningitis-Inf. paralysis | VISITED | |
| Trachoma-Ophthal. neonat. | VISITED | |
| Venereal disease | VISITED | |
| Scarlet fever | VISITED | 1 |

**LIFE EXTENSION**

| | |
|---|---|
| Applications received | 23 |
| Examinations made | 25 |
| Midwives instructed | |

**COUNTY DEPENDENTS**

| | |
|---|---|
| Visits to county home | 1 |
| Visits to county jail | 3 |
| Visits to convict camps | 1 |
| Patients treated | 2 |
| Treatments given | 4 |
| Lunacy examinations | 1 |
| Physical exam. prisoners | 3 |

**NURSES' REPORT (General)**

| | |
|---|---|
| Number on duty | |
| Lectures | |
| Attendance | |
| Office visits | |
| Assistance to H.O hours | |
| News articles | |
| Letters sent | |

**INFANT HYGIENE**

| | |
|---|---|
| Clubs organized | |
| Clubs visited | |
| Demonstrations | |
| Conferences, personal | |
| Cases visited-mother | |
| Cases visited-child | |
| Midwives instructed | |
| Furnished silver nitrate | |
| Schools visited | |
| Children examined | |
| Ref. to S.B.H. for prenatal letters | |
| Ref to S.B.H for diet cards | |
| Ref to S.B.H for preschool advice | |
| Sanitary privies | |

**TUBERCULOSIS**

| | |
|---|---|
| New cases | |
| Visits made, instructive | |
| Visits made, nursing | |
| Demonstrations | |
| Conferences, personal | |
| Sent to physician | |
| Discharged to sanatorium | |
| Discharged cured | |
| Home care only | |

Remarks

Fig. 79.—Statistical summary of work of county health department for one month. Indicates range of activities undertaken. Southern States

## ACTIVITIES OF COUNTY HEALTH DEPARTMENTS

Fig. 79, page 195, gives a concise statistical summary of the activities of a typical county health department for the month of February, 1920. During the same month there were seventy other county health departments in twelve Southern States engaged in similar activities. It will be seen that attention centers in the prevention of soil pollution and its attending diseases, such as typhoid fever, infant diarrhea, the dysenteries, and hookworm; in life extension work; in the medical inspection and treatment of school children; the quarantine of infectious diseases; the prevention of tuberculosis; and in infant welfare. Effort is made to stress the fundamental principles of healthful living, to develop an accurate system of reporting vital statistics, and to establish at least the nucleus of a public health laboratory service.

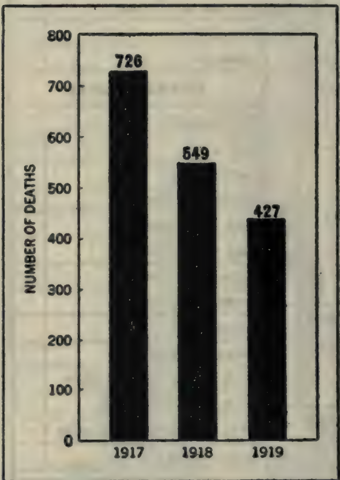


Fig. 80.—Deaths from typhoid fever in North Carolina, 1917 to 1919

**Prevention of Soil Pollution.** This phase of the work seeks primarily to secure the installation and use of a sanitary latrine at every home. Inspectors of the health department visit the homes throughout the county, make sanitary inspections, and leave behind them plans and specifications for approved latrines. The inspectors later repeat their visits to observe whether the improvement recommended has been made. Their task is simplified in states or communities where there are ordinances requiring the use of latrines; here the inspectors merely see that the law is enforced. The activities against soil pollution also include the making of examinations for hookworm disease and the treatment of those who are found to be infected.

**Medical Inspection and Dental Service for Rural Children.** The school children of the county are medically inspected in order to obtain a record of the physical condition of every child and treatment for those who need it. The teachers insert on the record card for each child the date of birth, age on entering school, grades repeated (if any), history of diseases in family, the child's height, weight, and chest expansion, the condition of his teeth, eyes, ears, and throat, and the

Fig. 81.—Preventing pollution of the soil is a leading feature of county health work. Corrugated iron lining for pit latrines, adopted for use in Grenada county, Mississippi. In soils with ground-water level near the surface it is necessary to line the pits

Fig. 82.—Inexpensive superstructure erected over lined pit. Grenada county, Mississippi

state of his nutrition. The completed cards are then transmitted to the health officer, who carefully considers each case and examines every child whose card indicates it to possess a remediable defect or abnormality. The examination is made preferably in the presence of the parents, so that the health officer may discuss with them the advisability and the best methods of having the child treated.

The health departments make special effort to educate parents regarding the dangers of dental defects in their children and to impress upon them the importance of having these defects remedied. Traveling dental clinics are provided for rural school children. The great majority of the patients reached by this service are very young children who have never before visited a dentist.

**Infant Welfare.** This division of the work seeks to lower the death rate among babies and young children by systematically instructing mothers in the principles of infant and child hygiene. The nurse who conducts this unit of work holds clinics at the health office and at other places throughout the county, and gives a course of intensive study to clubs and other women's organizations. Literature for the study course is provided by the state board of health. A clinic conducted by the health officer concludes the course. The nurse arranges to meet the club once a month thereafter for the discussion of community health conditions and for consultations with mothers. She endeavors to give personal instruction to all expectant mothers, to mothers of bottle-fed babies and of babies with diarrhea, and to persons living in homes where tuberculosis exists. She is also charged with supervising and instructing midwives.

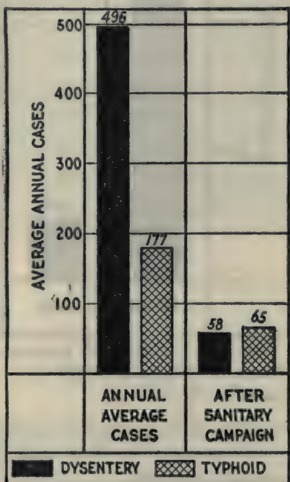


Fig. 83.—Reduction in average annual number of cases of dysentery and typhoid. Situation in Troup county, Georgia, before and after inauguration of county health work compared

**Life Extension.** The life extension work has proved very popular and has served as a means of enlisting the interest and co-operation of influential citizens. It consists of making thorough physical examinations of adults. The work is intended primarily for persons who are well, and its object is to keep them at their highest state of efficiency. Periodic medical examinations will often detect latent or incipient impairments in health, find minor defects which injure the citizen and decrease his working capacity, and so make it possible

for him to secure medical attention before the condition becomes serious or permanent. The examinations, which include urine and blood-pressure tests, are made in the health office. Treatment is never given. If medical or surgical attention seems advisable, the patient chooses his own physician. Each person receives, however, oral and printed advice and appropriate health literature.

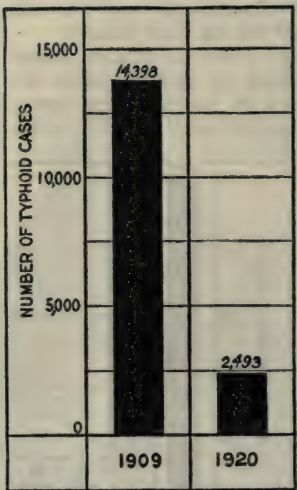

Fig. 84.—Cases of typhoid fever in Virginia, 1909 compared with 1920

**Control of Communicable Diseases.** This is effected through the state quarantine law, which usually requires the attending physician or the householder to report acute infectious diseases. The health department, upon receiving these reports, sends literature on the disease to the householder and to the school teacher in the district wherein the home is located; and the health officer visits the homes of as many as possible of the cases to give personal instruction in the means of preventing the spread of the disease. Usually the county health office keeps a record of each case reported, transmits notices and detailed monthly reports to the epidemiologist of the state board of health, submits to the newspapers monthly articles on the quarantine work of the county, and publishes in the papers the name and address of each case of communicable disease reported.

## EDUCATING THE PUBLIC IN HEALTHFUL LIVING

The work of the county departments always stresses the educational phase. The health officer and his assistants try to present the facts of public hygiene and sanitation in such way that they may benefit every citizen in the county. Lectures and demonstrations, newspaper articles, literature, clinics, and consultations in house-to-house visits form the main channels through which the public is reached. The schools invariably receive special attention, catechisms and similar material on hygienic topics being frequently prepared for use in them. In certain southern counties, as a result of health teaching, the schools have formed organizations to look after the sanitary condition of the school district and to make reports to the health officer.

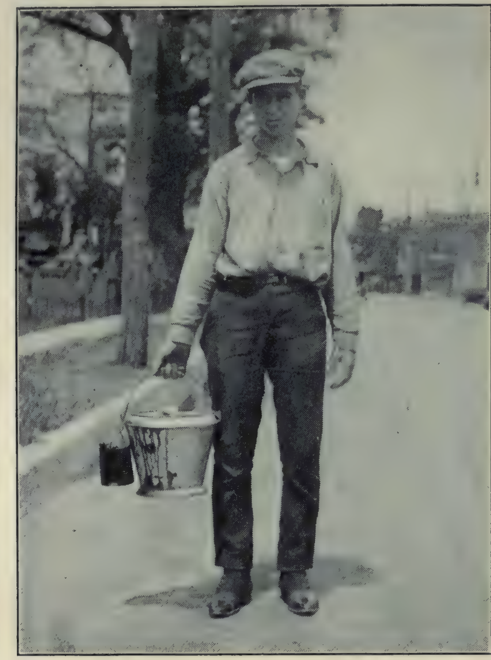

Fig. 85.—Anti-plague work, Beaumont, Texas: to the left, rat catcher starting out on daily rounds; to the right, rat catchers returning with their catch. A special activity of a Texas county health department


Fig. 86.—Advertising the county health department. Sign board displayed at Logan, the county seat of Logan county, West Virginia

Other publicity devices which have been used with much success consist of health slogans painted on mileposts on the county highways, of weekly bulletins distributed through the county, of letter seals for the use of the department of health, and of exhibits at the county fairs. When the milepost sign is used, two advertisements on each post defray the cost of erecting the posts. In certain instances a contest is held to secure effective sentences for use as slogans. When this is done the business men of the county sometimes agree to furnish the necessary prizes; and men, women, and children in every part of the county take part in the contests. By means of the signs it is possible not only to foster county pride and spirit, to aid visitors, and to advertise the merchants of the county, but also to drive home through repetition the need of preventing disease and the methods by which this may be accomplished.

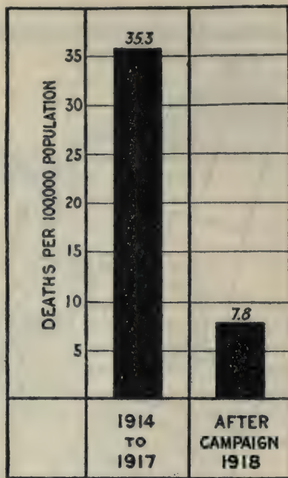


Fig. 87.—Deaths per hundred thousand from typhoid fever, before and after inauguration of county health work. Nine North Carolina counties

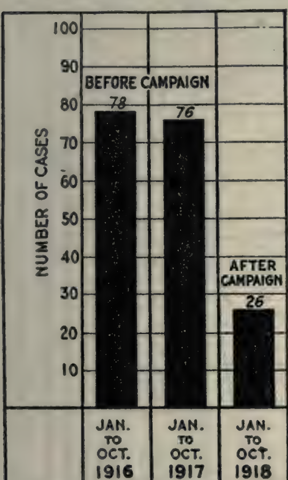


Fig. 88.—Comparison of typhoid cases before and after county health work. Wicomico county, Maryland

## REDUCTION IN INCIDENCE OF DISEASE

The most direct evidence of the effectiveness of county health work is to be found in the lowering of sickness and death rates. In North Carolina the number of cases of typhoid fever was reduced from 726 in 1917 to 427 in 1919. This represents a decrease from 29.6 to 16.9 per 100,000 in the typhoid death rate. For each death from typhoid fever it is estimated that there are on the average ten cases, and each case is

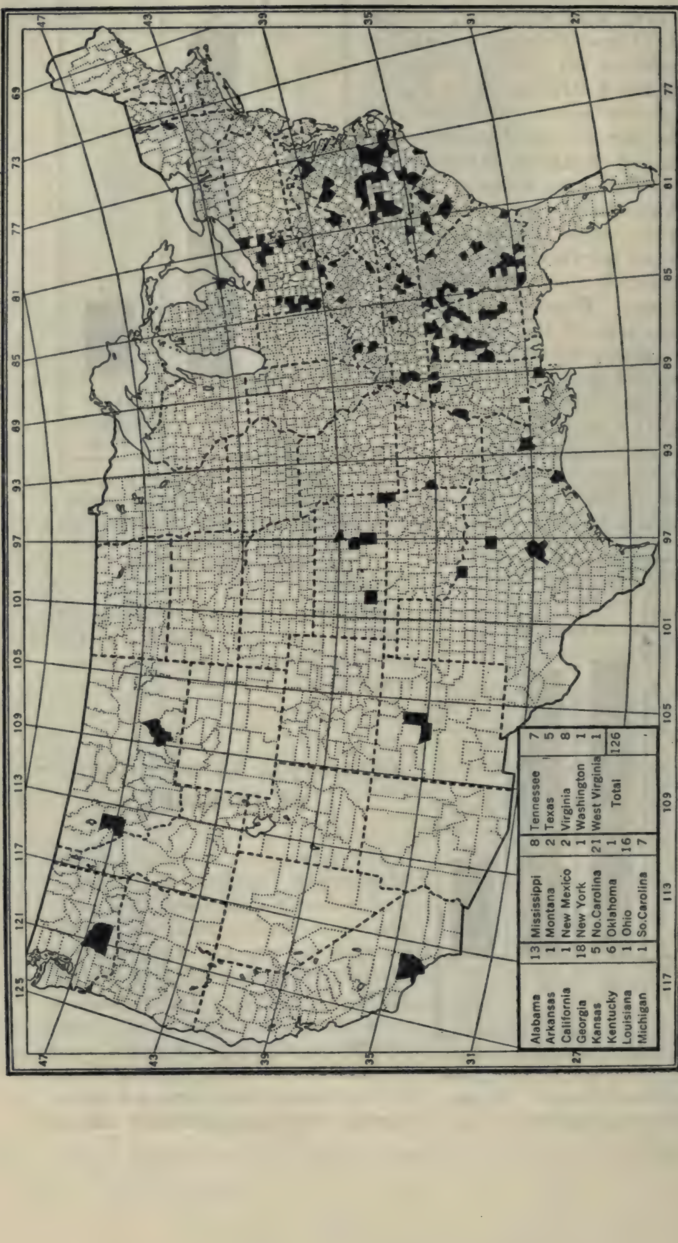


Fig. 89.—Counties or rural districts of United States having health departments with a whole-time health officer in charge. On December 31, 1920, there were 126 of these departments in the country

estimated to cause a loss to the state of not less than $400. In Monroe county, Mississippi, where 8,465 persons were inoculated for typhoid fever between 1918 and 1920 and a total of 1,811 sanitary privies were installed during the same period, the typhoid cases in 1920 numbered 89.8 per cent less than in 1917. Figs. 27, 80, 83, 84, 87, and 88, pages 115 and 196 to 203, depict graphically the reduction in various diseases that has occurred in states in which county health work has been conducted.

## EXTENSION OF WORK TO OTHER STATES

The plan of work in operation in the Southern States is applicable to other sections as well. It is, in fact, already being adopted by states in other sections. There were in the country on December 31, 1920, not less than one hundred twenty-six rural counties or districts having county health departments each with a whole-time health officer (Fig. 89, page 204). Kansas and New Mexico are among the latest states to establish such departments.

# TABULAR SUMMARY

TABLE 1: *All Countries—Persons Enumerated in Census, Microscopically Examined, Found Infected, Given First Treatment, and Cured of Hookworm Disease in Areas Completed during 1920, by Geographical Regions. Figures Excluded for Areas in Which Work Was Still in Progress*

| Geographical Region | Census | Microscopically Examined | | Found Infected | | Given First Treatment | | Cured | |
|---|---|---|---|---|---|---|---|---|---|
| | | Number | Per Cent | Number | Per Cent | Number | Per Cent | Number | Per Cent |
| **Total** | .. | .. | .. | .. | .. | **292,567** | .. | **189,628** | **64.8** |
| Southern States[1] | .. | 19,460 | .. | 5,688 | 29.2 | 6,471[2] | .. | 22 | 0.3 |
| West Indies | 29,138 | 28,890 | 99.1 | 16,067 | 55.6 | 15,274 | 95.1 | 12,867 | 84.2 |
| Central America[3] | 164,654 | | 85.2 | 78,580 | 56.0 | 67,963 | 86.5 | 31,093 | 45.7 |
| South America | 120,366 | 110,192 | 91.5 | 84,406 | 76.6 | 74,400 | 88.1 | 49,330 | 66.3 |
| The East[4] | .. | .. | .. | .. | .. | 128,459 | .. | 96,316 | 75.0 |

[1] During 1920, in the Southern States, the main emphasis in work against soil pollution diseases was placed on the building and improving of latrines.

[2] Some of the persons treated were found infected during 1919.

[3] In Central America the bulk of the work is by the dispensary plan. This does not afford opportunity for frequent re-examinations to determine cure. Consequently the percentage of persons known to be cured is low in comparison with that for other regions.

[4] In Ceylon, throughout 1920, estate laborers were assumed to be infected, and accordingly were given first treatment without preliminary microscopic diagnosis. This explains the blank spaces for "Census," "Microscopically Examined," and "Found Infected" in the lines for "The East" and "Total."

TABLE 2: *Southern States—Persons Enumerated in Census, Microscopically Examined, Found Infected, Given First Treatment, and Cured of Hookworm Disease in Areas Completed during 1920, by States. Figures Excluded for Areas in Which Work Was Still in Progress*[1]

| State | Census | Microscopically Examined | | Found Infected | | Given First Treatment | | Cured | |
|---|---|---|---|---|---|---|---|---|---|
| | | Number | Per Cent | Number | Per Cent | Number | Per Cent | Number | Per Cent |
| **Total** | .. | **19,460** | .. | **5,688** | **29.2** | **6,471**[2] | .. | **22** | **.3** |
| Alabama | .. | 504 | .. | 381 | 75.6 | 516 | .. | 8 | 1.2 |
| Georgia | .. | 397 | .. | 236 | 59.4 | 236 | 100.0 | .. | .. |
| Mississippi | 35,724 | 13,943 | 39.0 | 4,452 | 31.9 | 4,452 | 100.0 | 2 | [3] |
| South Carolina | .. | 3,408 | .. | 578 | 17.0 | 1,237[2] | .. | .. | .. |
| Tennessee | 9,928 | 644 | 6.5 | 28 | 4.3 | 20 | 71.4 | 5 | 25.0 |
| Texas | 467 | 257 | 55.0 | 12 | 4.7 | 9 | 75.0 | 6 | 67.7 |
| Virginia | 2,839 | 307 | 10.8 | 1 | 0.3 | 1 | 100.0 | 1 | 100.0 |

[1] During 1920, in the Southern States, the main emphasis in work against soil pollution diseases was placed on the building and improving of latrines.

[2] Some of the persons treated were found infected during 1919.

[3] Less than one-tenth of one per cent.

TABLE 3: *West Indies—Persons Enumerated in Census, Microscopically Examined, Found Infected, Given First Treatment, and Cured of Hookworm Disease in Areas Completed during 1920, by Countries. Figures Excluded for Areas in Which Work Was Still in Progress*

| Country | Census | Microscopically Examined | | Found Infected | | Given First Treatment | | Cured | |
|---|---|---|---|---|---|---|---|---|---|
| | | Number | Per Cent | Number | Per Cent | Number | Per Cent | Number | Per Cent |
| **Total** | **29,138** | **28,890** | **99.1** | **16,067** | **55.6** | **15,274** | **95.1** | **12,867** | **84.2** |
| Jamaica | 13,889 | 13,748 | 99.0 | 3,915 | 28.5 | 3,605 | 92.1 | 3,203 | 88.8 |
| St. Lucia | 6,401 | 6,373 | 99.6 | 4,743 | 74.4 | 4,656 | 98.2 | 4,261 | 91.5 |
| Trinidad | 8,848 | 8,769 | 99.1 | 7,409 | 84.5 | 7,013 | 94.7 | 5,403 | 77.0 |

TABLE 4: *Central America—Persons Enumerated in Census, Microscopically Examined, Found Infected, Given First Treatment, and Cured of Hookworm Disease in Areas Completed during 1920, by Countries. Figures Excluded for Areas in Which Work Was Still in Progress*

| Country | Census | Microscopically Examined | | Found Infected | | Given First Treatment | | Cured[1] | |
|---|---|---|---|---|---|---|---|---|---|
| | | Number | Per Cent | Number | Per Cent | Number | Per Cent | Number | Per Cent |
| **Total** | **164,654** | **140,318** | **85.2** | **78,580** | **56.0** | **67,963** | **86.5** | **31,093** | **45.7** |
| Costa Rica | 43,134 | 36,454 | 84.5 | 10,743 | 29.5 | 8,966 | 83.5 | 4,768 | 53.2 |
| Guatemala | 22,887 | 21,460 | 93.8 | 12,805 | 59.7 | 11,429 | 89.3 | 6,777 | 59.3 |
| Nicaragua | 45,160 | 33,128 | 73.3 | 25,272 | 76.3 | 22,035 | 87.2 | 8,395 | 38.1 |
| Panama | 14,392 | 13,104 | 91.1 | 10,050 | 76.7 | 8,353 | 83.1 | 4,009 | 48.0 |
| Salvador | 39,081 | 36,172 | 92.6 | 19,710 | 54.5 | 17,180 | 87.2 | 7,144 | 41.6 |

[1] In Central America the bulk of the work is by the dispensary plan. This does not afford opportunity for frequent re-examinations to determine cure. Consequently the percentage of persons known to be cured is low in comparison with that for other regions.

TABLE 5: *South America—Persons Enumerated in Census, Microscopically Examined, Found Infected, Given First Treatment, and Cured of Hookworm Disease in Areas Completed during 1920, by Countries. Figures Excluded for Areas in Which Work Was Still in Progress.*

| State and Country | Census | Microscopically Examined | | Found Infected | | Given First Treatment | | Cured | |
|---|---|---|---|---|---|---|---|---|---|
| | | Number | Per Cent | Number | Per Cent | Number | Per Cent | Number | Per Cent |
| **Total** | **120,366** | **110,192** | **91.5** | **84,406** | **76.6** | **74,400** | **88.1** | **49,330** | **66.3** |
| Brazil | 112,488 | 103,329 | 91.9 | 78,363 | 75.8 | 68,706 | 87.7 | 44,977 | 65.5 |
| Federal District | 18,163 | 16,961 | 93.4 | 11,579 | 68.3 | 10,583 | 91.4 | 5,179 | 48.9 |
| Minas Geraes | 12,563 | 11,534 | 91.8 | 5,068 | 43.9 | 4,632 | 91.4 | 2,866 | 61.9 |
| Paraná | 24,506 | 22,410[1] | 91.4 | 17,329[1] | 77.3 | 14,486 | 83.6 | 9,391 | 64.8 |
| Rio de Janeiro | 31,897 | 28,814[2] | 90.3 | 25,626[2] | 88.9 | 22,672 | 88.5 | 15,471 | 68.2 |
| São Paulo | 25,359 | 23,610 | 93.1 | 18,761 | 79.5 | 16,333 | 87.1 | 12,070 | 73.9 |
| Colombia | 7,878 | 6,863 | 87.1 | 6,043 | 88.1 | 5,694 | 94.2 | 4,353 | 76.4 |

[1] Includes 3,178 not required to submit specimens but examined for treatment.
[2] Includes 7,011 not required to submit specimens but examined for treatment.

TABLE 6: *The East—Persons Enumerated in Census, Microscopically Examined, Found Infected, Given First Treatment, and Cured of Hookworm Disease in Areas Completed during 1920, by Countries. Figures Excluded for Areas in Which Work Was Still in Progress*

| Country | Census | Microscopically Examined | | Found Infected | | Given First Treatment | | Cured | |
|---|---|---|---|---|---|---|---|---|---|
| | | Number | Per Cent | Number | Per Cent | Number | Per Cent | Number | Per Cent |
| **Total**[1] | .. | .. | .. | .. | .. | **128,459** | .. | **96,316** | **75.0** |
| Australia | 5,190 | 5,008 | 96.5 | 350 | 7.0 | 345 | 98.6 | 305 | 88.4 |
| Ceylon[1] | .. | .. | .. | .. | .. | 117,337 | .. | 95,302 | 81.2 |
| Seychelles | 1,529 | 1,525 | 99.7 | 902 | 59.1 | 853 | 94.5 | 685 | 80.3 |
| Siam | 23,091 | 12,591 | 54.5 | 10,216 | 81.1 | 9,924 | 97.1 | 24 | 0.2 |

[1] In Ceylon, throughout 1920, estate laborers were assumed to be infected, and accordingly were given first treatment without preliminary microscopic diagnosis. This explains the blank spaces for "Census," "Microscopically Examined," and "Found Infected" in the lines for "Ceylon" and "Total."

# FINANCIAL STATEMENT

TABLE 7: *Expenditures of the International Health Board Covering its Activities During the Year 1920*

| Fields of Activity | | Amount Expended |
|---|---|---|
| **Grand Total** | | **$1,658,269.66** |
| Relief and Control of Hookworm Disease | | 623,804.86 |
| Malaria Control | | 132,118.67 |
| Yellow Fever Control | | 139,757.40 |
| Tuberculosis in France | | 518,013.51 |
| Public Health Education | | 68,553.35 |
| Field Staff Salaries, Expenses, etc., not Prorated to Specific Budgets | | 25,917.60 |
| Miscellaneous | | 58,632.07 |
| Administration | | 91,472.20 |
| Itemization by States and Countries | | |
| Relief and Control of Hookworm Disease | | 623,804.86 |
| Southern States | | 144,201.84 |
| West Indies | | 62,025.73 |
| Central America | | 97,304.00 |
| South America | | 206,425.84 |
| The East | | 113,847.45 |
| Southern States | $144,201.84 | |
| Administration | 6,032.20 | |
| Alabama | 17,256.72 | |
| Georgia | 4,525.39 | |
| Kansas | 4,494.00 | |
| Kentucky | 16,599.03 | |
| Mississippi | 20,709.72 | |
| New Mexico | 957.04 | |
| North Carolina | 10,463.00 | |
| South Carolina | 17,210.63 | |
| Tennessee | 13,533.22 | |
| Texas | 14,723.99 | |
| Virginia | 14,965.17 | |
| West Virginia | 2,731.73 | |
| West Indies | 62,025.73 | |
| Administration | 6,039.23 | |
| British Guiana[1] | 486.37 | |
| Dutch Guiana[1] | 738.34 | |
| Jamaica | 18,400.09 | |
| Porto Rico | 7,823.35 | |
| Santo Domingo | 1,077.07 | |
| St. Lucia | 11,444.57 | |
| Trinidad | 16,016.71 | |

[1] For administrative reasons, British and Dutch Guiana, although on the mainland of South America, are considered West Indian Colonies.

TABLE 7: *Expenditures of the International Health Board Covering its Activities During the Year 1920—Continued*

| Fields of Activity | | Amount Expended |
|---|---|---|
| Relief and Control of Hookworm Disease—*Continued* | | |
| Central America | $97,304.00 | |
| Administration | 7,178.01 | |
| Costa Rica | 20,219.60 | |
| Guatemala | 17,126.43 | |
| Nicaragua | 18,745.12 | |
| Panama | 20,061.02 | |
| Salvador | 13,973.82 | |
| South America | 206,425.84 | |
| Brazil | 193,560.95 | |
| Colombia | 12,864.89 | |
| The East | 113,847.45 | |
| Administration | 7,178.01 | |
| Australia | 35,417.31 | |
| Borneo | 3,106.23 | |
| Ceylon | 34,154.28 | |
| India | 7,810.00 | |
| Mauritius | 5,688.56 | |
| Seychelles Islands | 4,643.03 | |
| Siam | 15,850.03 | |
| Malaria Control | | $132,118.67 |
| Southern States | | 121,652.24 |
| Foreign Countries | | 10,466.43 |
| Southern States | $121,652.24 | |
| Administration | 6,032.20 | |
| Alabama | 8,906.92 | |
| Arkansas | 7,048.90 | |
| Georgia | 1,230.86 | |
| Louisiana | 30,699.94 | |
| Mississippi | 27,537.43 | |
| North Carolina | 7,526.13 | |
| South Carolina | 13,942.74 | |
| Tennessee | 1,969.94 | |
| Texas | 11,472.34 | |
| Virginia | 5,284.84 | |
| Foreign Countries | 10,466.43 | |
| Ecuador | 4,595.59 | |
| Nicaragua | 425.66 | |
| Porto Rico | 5,445.18 | |

TABLE 7: *Expenditures of the International Health Board Covering its Activities During the Year 1920—Continued*

| Fields of Activity | Amount Expended |
|---|---|
| Yellow Fever Control | $139,757.40 |
| Epidemic work | 23,539.03 |
| Ecuador | 28,574.98 |
| Salvador | 3,926.26 |
| Expenses of Investigating Commissions and salaries, expenses, etc., of Director and Associates | 83,717.13 |
| Tuberculosis in France | 518,013.51 |
| Central Administration | 86,310.57 |
| Medical Division | 80,226.08 |
| Public Health Visitation | 76,191.46 |
| Educational Division | 135,920.64 |
| Departmental Organization | 139,364.76 |
| Public Health Education | 68,553.35 |
| Department of Hygiene—Faculdade de Medicina e Cirurgia de São Paulo | |
| Operating Expenses | 30,143.51 |
| Fellowships | 38,409.84 |
| Miscellaneous | 58,632.07 |
| Conference of State Health Officers | 2,488.71 |
| Conference of Malaria Workers | 1,810.35 |
| Czechoslovakia—Public Health Work | 12,708.81 |
| Drugs for Conserving Health of Field Staff | 32.29 |
| Express, Freight, and Exchange | 557.85 |
| Field Equipment and Supplies | 5,996.96 |
| Investigation of Scientific Preparation and Preservation of Powdered Milk | 500.00 |
| Medical Examination of Applicants for Field Staff | 125.00 |
| Motion Picture Film on Hookworm Disease | 2,817.73 |
| Pamphlets and Charts | 5,873.33 |
| Paris Conference on an International Nomenclature of Causes of Death | 615.30 |
| Repainting Office at Salvador | 75.00 |
| Surveys and Exhibits | 23,528.78 |
| Survey—Public Health Administration in Massachusetts | 1,467.27 |
| Study of Teaching of Hygiene and Public Health in Medical Schools | 34.69 |

# CHINA MEDICAL BOARD

## Report of the General Director

To the President of the Rockefeller Foundation:

Sir:

I have the honor to submit herewith my report as General Director of the China Medical Board for the period of January 1, 1920, to December 31, 1920.

Respectfully submitted,

GEORGE E. VINCENT,

General Director.

## CHINA MEDICAL BOARD

In 1915 the Rockefeller Foundation organized the China Medical Board and entrusted to it the task of assisting in developing modern medicine in China in co-operation with existing Chinese and other agencies. The original plans called for the establishment and maintenance by the Board of one or possibly two medical schools; and the provision of funds for increasing the staffs, buildings, and equipment of a number of mission hospitals, for strengthening the pre-medical work of certain existing colleges and universities, and for advancing the training of Chinese and missionary physicians.

The more important activities pursued during the year 1920 were of substantially similar nature to those of preceding years, and included (1) carrying forward the construction work on the buildings of the new Peking Union Medical College; (2) providing instruction to the students enrolled in the medical school, pre-medical school, and nurses' training school of this institution; (3) aiding medical education and pre-medical education in unaffiliated institutions; and (4) providing funds for strengthening medical work in mission-

ary hospitals, for undertaking a small amount of translation of Western scientific terms into the Chinese language, and for assisting Chinese and mission doctors who were engaged in graduate study.

# I. MEDICAL EDUCATION

## A. The Peking Union Medical College

The wholly reorganized and greatly enlarged Peking Union Medical College is the China Medical Board's special contribution to the cause of medicine in China. The organization, maintenance, and extension of the facilities of this institution have been the outstanding achievement of the Board since its organization. Hand in hand with the reconstruction and enlargement of the physical plant has proceeded a complete reorganization of the teaching staff until the school as it stands today represents a practically new institution.

The terms by which the Union Medical College was acquired by the newly organized China Medical Board stipulated that the management of the college should be vested in a Board of Trustees consisting of thirteen members, one appointed by each of the six American and British missionary organizations previously maintaining the college, and seven by the Rockefeller Foundation. (For the composition of this Board, see page 226.) During 1920 the administration of details continued, as in 1919, to be vested in the local Administrative Board (see page 227) representing the different departments of the school.

## BOARD OF TRUSTEES, PEKING UNION MEDICAL COLLEGE (IN NEW YORK)

*Chairman*

PAUL MONROE

*Vice-Chairman*

J. AURIOL ARMITAGE

*Secretary*

EDWIN R. EMBREE

*Assistant Secretary*

MARGERY K. EGGLESTON

*Executive Committee*

George E. Vincent, *Chairman*

Arthur J. Brown
Wallace Buttrick
Simon Flexner
Frank Mason North

*Members*

*To serve until the Annual Meeting of 1923*

Arthur J. Brown
Wallace Buttrick
James Christie Reid
George E. Vincent

*To serve until the Annual Meeting of 1922*

F. H. Hawkins
Paul Monroe
Frank Mason North
William H. Welch

*To serve until the Annual Meeting of 1921*

J. Auriol Armitage
James L. Barton
Simon Flexner
Robert H. Kirk
John R. Mott

These members have been elected as follows:

*By the Rockefeller Foundation*

Wallace Buttrick
Simon Flexner
Robert H. Kirk
John R. Mott
Paul Monroe
George E. Vincent
William H. Welch

*By the London Missionary Society*
F. H. Hawkins

*By the Medical Missionary Association of London*
James Christie Reid

*By the American Board of Commissioners for Foreign Missions*
James L. Barton

*By the Society for the Propagation of the Gospel in Foreign Parts*
J. Auriol Armitage

*By the Board of Foreign Missions of the Methodist Episcopal Church*
Frank Mason North

*By the Board of Foreign Missions of the Presbyterian Church in the United States of America*
Arthur J. Brown

## ADMINISTRATIVE BOARD, PEKING UNION MEDICAL COLLEGE (IN PEKING)

*Chairman*
HENRY S. HOUGHTON, *ex-officio*

*Vice-Chairman*
ROGER S. GREENE

*Secretary*
J. PRESTON MAXWELL

*Executive Committee*
Henry S. Houghton, *Chairman, ex-officio*
Roger S. Greene, *ex-officio*
Donald E. Baxter, *ex-officio*
Franklin C. McLean
William Warren Stifler

*Members, ex-officio*
Donald E. Baxter
Edmund V. Cowdry
Alvert Menzo Dunlap
Roger S. Greene
Henry S. Houghton
Harvey James Howard
John H. Korns
Bernard E. Read
William Warren Stifler
Philip Allen Swartz
Anna Dryden Wolf

Certain changes in the functions and composition of the Administrative Board appeared to be desirable, and one accomplishment of 1920 was the adoption of a plan of reorganization to go into effect in 1921. The points emphasized in the new plan are: separation of educational and administrative affairs; recognition of the principle of full representation of all divisions of the work; and the creation, in the interests of efficiency, of two small executive bodies with the Director acting as a medium of communication between Trustees and college administrative units.

At the annual meeting of the Trustees in April, 1920, Dr. Franklin C. McLean tendered his resignation as Director of the College and was succeeded on December 28, 1920, by Dr. Henry S. Houghton, who has been connected since 1916 with the work of the China Medical Board. Dr. McLean retained his connection with the College as professor and head of the department of medicine. Dr. Richard M. Pearce, Director of the Division of Medical Education of the Rockefeller Foundation, sailed for China in September to spend a year at the Peking school in an advisory capacity. On Dr. Houghton's return to the United States to attend the special meeting of the Peking Trustees held December 28, 1920, Dr. Pearce was appointed interim Acting Director.

Plant. The new buildings for the medical school occupy a large tract in the heart of the Republic's capital which was formerly the site of the palace of a Manchu prince. Gray brick has been used in the fourteen buildings which comprise the group, the basic construction being of a simple, substantial type. The predominant architectural note is Chinese, with scarlet pillars, jade green, glazed tile roofs, and painted eaves, after the manner of palaces of Chinese princes. The buildings and equipment have been designed to offer both elementary and advanced instruction in the medical sciences, in the clinical branches, and in hospital training.

The medical school unit—comprising the anatomy, physiology, and chemistry buildings—was opened in the fall of 1919. During 1920 progress in construction brought to completion the pathology and hospital administration buildings, the nurses' home, the stores department and power plant, the admissions and ward buildings, the animal house, and the service court. The exterior construction of the auditorium was completed but no work was done on the interior: this will probably be the last building to be finished. At the close of 1920 the out-patients' and private patients' units required but a few more months' work, and the hospital will be ready for occupancy during 1921. The week of Septem-

ber 15-22, 1921, has been set for the dedication of the College.

Two large compounds belonging to the school contain residences for the faculty and staff. The buildings—of brick and concrete, with slate roofs—are fitted with Western conveniences and are suitable for foreign occupancy. The fourteen new residences in the south compound were completed in the fall of 1918, while the entire north compound was ready for occupancy at the end of 1920.

One of the buildings which formerly housed the old Union Medical College has been utilized, with some remodeling, for the pre-medical school with its three-year course preparatory for the medical department,[1] and another—the original men's hospital—for clinical work pending the completion of the new general hospital.

Work of the School: *Instruction.* The course of study for the first year of the medical school, adopted for 1919-1920 and the following years, includes a total of between twenty-eight and thirty-three hours a week during three terms, spent on anatomy, Chinese (scientific), embryology and histology, English, French or German, physiology, and physiological chemistry. The second year course of study, first offered for the

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[1] A report on the work of the pre-medical school is to be found under Pre-Medical Education, page 255.

Fig. 90.—Entrance to hospital and nurses' home showing native Chinese buildings in foreground

Fig. 91.—North residence compound which contains residences for sixteen families

year 1920-1921, includes from twenty-five to thirty-three hours a week divided among bacteriology, Chinese (scientific), English, French or German, hygiene, neurology, parasitology, pathology, pharmacology, pharmacy, physical diagnosis, physiology, and therapeutics. The following summary gives in tabular form a list of the subjects studied during the first and second years:

## COURSES OFFERED IN THE MEDICAL SCHOOL

### First Year

| *First Trimester* | Hours per week | *Second Trimester* | Hours per week | *Third Trimester* | Hours per week |
|---|---|---|---|---|---|
| Anatomy | 15 | Anatomy | 15 | | |
| Histology and Embryology | 9 | Histology and Embryology | 9 | | |
| Physiology | 6 | | | Physiology | 12 |
| English | 2 | English | 2 | English | 2 |
| | | Physiological Chemistry | 7 | Physiological Chemistry | 9 |
| | | | | French or German | 3 |
| | | | | Scientific Chinese | 2 |
| Total hours | 32 | Total hours | 33 | Total hours | 28 |

### Second Year

| *First Trimester* | Hours per week | *Second Trimester* | Hours per week | *Third Trimester* | Hours per week |
|---|---|---|---|---|---|
| Neurology | 8 | | | | |
| Pharmacy | 1 | | | | |
| Bacteriology | 14 | | | | |
| English | 1 | English | 1 | | |
| Scientific Chinese | 1 | | | | |
| | | Physiology | 8 | | |
| | | Pharmacology | 9 | Pharmacology | 11 |
| | | Pathology | 9 | Pathology | 9 |
| | | Parasitology | 5 | | |
| | | French or German | 1 | French or German | 1 |
| | | | | Hygiene | 3 |
| | | | | Therapeutics | 2 |
| | | | | Physical Diagnosis | 2 |
| Total hours | 25 | Total hours | 33 | Total hours | 28 |

Each class of the three schools—the medical college, the pre-medical school, and the school for nurses—has capacity for approximately twenty-five students. The enrolment for 1919-1920 reached forty-three, of whom seven were registered in the first year class of the medical school, two as graduate students, and thirty-four in the classes of the pre-medical school. The 1920–1921 enrolment was seventy-nine, of whom thirteen were registered in the two classes of the medical school, seven as special students, and fifty-nine in the pre-medical school.

*Research and Work in Special Fields.* In view of the fact that the college is just beginning its work in the new buildings, any extended account of the scholarly work of the institution is deferred for future reports.

*Hospital.* The progress made with construction work on the new hospital indicates that the last of the buildings will probably be completed in June. The hospital will have a total bed capacity of 250. It is not expected that all the beds will be opened until the classes become larger than at present. Pending the completion of the new hospital building, the original men's hospital on the Hsinkailu has been kept open and the clinical members of the staff have conducted activities there. Dr. Howard and Dr. Li have conducted eye clinics throughout the

year, and the ear, nose, and throat work has been under the direction of Drs. Dunlap and Jui-hua Liu. During the fighting near Peking in the summer of 1920, between sixty and seventy wounded soldiers were accommodated in the hospital. Dr. George Y. Char, who, with Dr. Jui-heng Liu, performed most of the operations on the soldiers, invented several ingenious contrivances to increase the comfort of the patients and to facilitate attention to their wounds.

*Nurses' Training School.* Three Chinese students were enrolled at the opening of the Training School for Nurses, September 28, 1920. The innovation of training women nurses for general hospital service, including work in the men's wards, is being undertaken with caution. Some male Chinese nurses will continue to be employed pending the gradual establishment of the new system.

*Religious and Social.* The department of religious and social work, in charge of Rev. Philip A. Swartz, has conducted a regular program, including physical training, religious meetings, Bible study, and chapel service. The religious and social activities are purely voluntary and are conducted under the auspices of the Students' Christian Association.

The Men Nurses' Christian Association is organized upon lines similar to the Students' Chris-

tian Association, the chief difference being the general use of the Chinese language. Another body recently organized is the Students' Association, which aims to care for the athletic, social, and literary interests of students in the College and Pre-medical School.

Personnel. At the end of December, 1920, the following persons composed the faculty of the Peking Union Medical College:

### THE MEDICAL SCHOOL

*Henry Spencer Houghton, Ph.B., M.D.*, Acting Director. Ohio State University, Ph.B., 1901. Johns Hopkins Medical School, M.D., 1905. Formerly dean and professor of tropical medicine, Harvard Medical School of China.

*Franklin C. McLean, B.S., M.S., Ph.D., M.D.*, Professor and head of the department of medicine. University of Chicago, B.S., 1907; M.S., 1912; Ph.D., 1915. Rush Medical College, M.D., 1910. Assistant resident physician, Hospital of the Rockefeller Institute, 1914–1916. Director, Peking Union Medical College, July 1, 1916, to April 30, 1920.

*Edmund V. Cowdry, A.B., Ph.D.*, Professor and head of the department of anatomy. University of Toronto, A.B., 1909. University of Chicago, Ph.D., 1912. Associate in anatomy, Johns Hopkins University, 1913–1917.

*Harvey James Howard, A.B., A.M., M.D., D.Oph.*, Professor and head of department of ophthalmology. University of Michigan, A.B., 1904. University of

Pennsylvania, M.D., 1908. Formerly in charge of eye, ear, and nose department, Canton Christian College.

*Adrian Stevenson Taylor, M.D.*, Professor and head of the department of surgery. Universities of Alabama and Virginia. University of Virginia, M.D., 1905. Formerly in charge of Southern Baptist Hospital, Yangchow, China.

*Ralph Garfield Mills*, A.B., M.D., Professor and head of the department of pathology. University of Illinois, A.B., 1903. Northwestern Medical College, M.D., 1907. Formerly director of department of research, Severance Union Medical College, Seoul, Korea.

*Davidson Black, M.B., A.B.*, Professor of embryology and neurology. University of Toronto, M.B., 1906; A.B., 1909. Formerly assistant professor of anatomy, Western Reserve Medical School.

*J. Preston Maxwell, B.S., M.B., M.D., L.R.C.P., F.R.C.S.*, Professor and head of the department of obstetrics and gynecology. University of London, B.S., M.B., 1898; M.D., 1910. Formerly in charge of Yungchun Hospital, Fukien.

*Albert Menzo Dunlap, A.B., M.D.*, Associate professor of otology, rhinology, and laryngology, and dean. University of Illinois, A.B., 1906. Harvard Medical School, M.D. Formerly professor of otology, rhinology, and laryngology, and chief of out-patient department, Harvard Medical School of China.

*Bernard E. Read, Ph.C., M.S.*, Associate professor of physiological chemistry. Yale University, M.S., 1918. Connected with Union Medical College, Peking, 1909–1916.

*Oswald H. Robertson, B.S., M.S., M.D.*, Associate professor of medicine. University of California, B.S., 1910; M.S., 1911. Harvard Medical School, M.D., 1915. Formerly assistant in pathology and bacteriology, Rockefeller Institute for Medical Research.

*Andrew H. Woods, A.B., M.D.*, Associate professor of neurology and psychiatry. Washington and Lee University, A.B., 1893. University of Pennsylvania, M.D., 1898. Formerly connected with Canton Hospital and Canton Christian College.

*Carl TenBroeck, A.B., M.D.*, Associate professor of bacteriology. University of Illinois, A.B., 1908. Harvard Medical School, M.D., 1913. Assistant in comparative pathology, Harvard Medical School, 1913–1915. Assistant, later associate, in department of animal pathology, Rockefeller Institute, Princeton, 1915–1920.

*Ernest W. H. Cruickshank, M.B., D.Sc.*, Associate professor of physiology. University of Aberdeen, M.B., 1910. University of London, D.Sc., 1919. Carnegie Research Fellow, Institute of Physiology, University College, London, 1911–1915.

*H. Jocelyn Smyly, A.M., M.D., B.Ch., L.M., F.R.C.S., I.*, Associate in medicine. Trinity College of Dublin University, undergraduate and medical work. Appointed to Union Medical College faculty under former management in 1913.

*Charles W. Young, B.S., M.D.*, Associate in medicine. University of Illinois, B.S., 1897. Johns Hopkins Medical School, M.D., 1903. Connected with the Union Medical College under former management from 1906, for several years dean.

Fig. 92.—Soldiers wounded in the summer of 1920 being cared for at the College hospital

Fig. 93.—Dining room for hospital resident staff, in private patients' pavilion

*John H. Korns, A.B., A.M., M.D.*, Associate in medicine. Ohio Wesleyan University, A.B., 1904. Rush Medical College, M.D., 1909. Appointed to Union Medical College faculty under former management in 1915.

*William G. Lennox, A.B., M.D.*, Associate in medicine. Colorado College, A.B., Harvard Medical School, M.D. Formerly instructor in medicine and assistant physician, Union Medical College, Peking.

*Tsing-meu Li, M.D.*, Associate in ophthalmology. Oahu College, Honolulu, T.H. St. John's University, Shanghai, School of Medicine. University of Pennsylvania, M.D., 1909. Formerly on staff of Hunan-Yale Hospital.

*Jui-heng Liu, B.S., M.D.*, Associate in surgery. Harvard University, B.S., 1910; M.D., 1913. Formerly connected with Red Cross General Hospital, Shanghai.

*Edgar T. H. Tsen, M.D.*, Associate in bacteriology. Boone University, Wuchang; Harvard Medical School of China, M.D., 1914. Postgraduate work at Harvard Medical School, Boston, and College of Physicians and Surgeons, Columbia University.

*Paul C. Hodges, B.S., M.D.*, Associate in roentgenology. University of Wisconsin, B.S., 1915. Washington University School of Medicine, M.D., 1918. School of Roentgenology, Camp Greenleaf, 1918. Formerly photomicroscopist to department of surgery, Washington University School of Medicine.

*Hartley C. Embrey, A.B., M.S.*, Associate in physiological chemistry. University of Nashville, A.B., 1907. University of Chicago, M.S., 1915. Head of department of science, Central High School, Chattanooga,

Tennessee, 1917–1918. Experimental work with DuPont Company, 1918–1919.

*Ernest Carrol Faust, A.B., A.M., Ph.D.*, Associate in parasitology. Oberlin College, A.B., 1912. University of Illinois, A.M., 1914; Ph.D., 1917. Instructor in zoology, University of Illinois, 1917–1919.

*Samuel R. Detwiler, A.M., Ph.B., Ph.D.*, Associate in anatomy. Yale University, Ph.B., 1914; A.M., 1916; Ph.D., 1918. Yale University, laboratory instructor in biology, comparative anatomy, embryology, plant morphology, 1913–1916. Yale School of Medicine, instructor in anatomy, 1917–1920.

*Frank Meleney, A.B., M.D.*, Associate in surgery. Dartmouth College, A.B., 1910. College of Physicians and Surgeons, Columbia University, M.D., 1916. Instructor in surgery, Presbyterian Hospital and College of Physicians and Surgeons, New York, 1919–1920.

*Alice H. Cook, A.B., M.D.*, Associate in otology, rhinology, and laryngology. Mt. Holyoke College, A.B., 1908. Woman's Medical College of Philadelphia, M.D., 1913. Demonstrator of otology and anatomy, and instructor in clinical rhinology, laryngology, and otology, Woman's Medical College of Philadelphia, 1919–1920.

*Henry E. Meleney, A.B., M.D.*, Associate in pathology. Dartmouth College, A.B., 1909. College of Physicians and Surgeons, Columbia University, M.D., 1915. Resident pathologist, Presbyterian Hospital, New York, and instructor in pathology, College of Physicians and Surgeons, Columbia University, 1919–1920.

*S. Y. Wong, B.S., M.S.*, Associate in physiological chemistry. University of Chicago, B.S., 1916; M.S., 1917.

*Jui-hua Liu, M.D.*, Assistant in otology, rhinology, and laryngology. Anglo-Chinese College, Tientsin. Pei-yang Medical College, Tientsin, M.D., 1915. Postgraduate work, Harvard Medical School, 1917–1918; New York Eye and Ear Infirmary, 1918–1919.

*Richard H. P. Sia, B.S., M.D.* Assistant in medicine. Boone University, Wuchang, B.S., 1914. Western Reserve University, M.D., 1918. House and admitting officer, Cleveland City Hospital. Assistant resident in medicine, Peking Union Medical College, July, 1919–July, 1920.

*Robert Spencer Stone, A.B.*, Assistant in anatomy. Completed seven-year course in biology and physiology, University of Toronto, June, 1919, including first two years of medical course.

*Arthur Waitak Woo, M.B., B.S., M.R.C.S., L.R.C.P.*, Assistant in obstetrics and gynecology. University College, London, M.R.C.S., L.R.C.P., 1913. Formerly obstetric and gynecological house surgeon, Middlesex Hospital, London.

*George Y. Char, B.S., M.D.*, Assistant in surgery. Boone University, Wuchang, B.S., 1909. Harvard Medical School of China, M.D., 1914. Postgraduate study at Harvard Medical School, Boston City Hospital, New York Polyclinic Hospital, and hospital of the Rockefeller Institute. Resident urologist, Long Island College Hospital, and surgical house officer, Bellevue Hospital.

*Paul Huston Stevenson, A.B., M.D.*, Assistant in anatomy. Hiram College, Ohio, A.B., 1912. Washington University, M.D., 1916. Luchowfu Hospital, Anhwei, China, 1917–1920.

*Hsien Wu, B.S.*, Assistant in physiological chemistry. Massachusetts Institute of Technology, B.S., 1916. Harvard Medical School, majoring physiological chemistry, 1917–1919. Assistant in chemistry, Massachusetts Institute of Technology, 1916–1917.

*Johannes H. Bauer, M.D.*, Assistant in bacteriology. Royal University of Upsala, M.D., 1915. Imperial University of Moscow, M.D., 1916. Assistant to professor of surgery, University of Moscow, 1916–1917. Surgeon on Trans-Baikal Railway, 1918. In charge of anti-typhus train, American Red Cross, Vladivostok, 1919–1920.

*K. H. Collins, B.S.*, Part-time assistant in physiology and pharmacology. University of Idaho, B.S., 1917. Rush Medical School, 1917–1919. Assisted in zoology and comparative anatomy, University of Idaho, 1919–1920.

*J. L. McCartney, B.S.*, Part-time assistant in physiology and pharmacology. University of Chicago, B.S., 1920.

*Ta-chih Pa, M.D.*, Clinical assistant in ophthalmology.

*H. S. Wang, B.Sc.*, Clinical assistant in roentgenology.

## THE DEPARTMENT OF RELIGIOUS AND SOCIAL WORK

*Philip Allen Swartz, A.B.*, Director of religious and social work. Lafayette College, A.B., 1910. Union Theological Seminary. Ordained by Presbytery of Newark, N.J., 1917. Formerly pastor of church of Forest Hills, Long Island, N.Y., (union, undenominational).

*Stephen Wang, A.B.*, Assistant to director of religious and social work.

## THE TRAINING SCHOOL FOR NURSES

*Anna Dryden Wolf, A.M., R.N.*, Superintendent of nurses.

*Mary Louise Beaty, B.S., R.N.*, Instructor.

*Ruth Ingram, A.B., R.N.*, Assistant supervisor.

### Graduate Nurses

*Lucy Abbott, R.N.*
*Kathleen Caulfield, R.N.*
*Helen R. Goforth*
*Florence Kelley Goodman, R.N.*
*Mary L. Grayson, R.N.*
*Elsie Matilda Hackett, R.N.*
*Frances S. Hall, R.N.*
*Virginia Harrell, R.N.*
*Helen M. Holland, R.N.*
*Dorothy Jacobus, A.B., R.N.*
*Mary Van S. McCoy, R.N.*
*Mary Priscilla Moo*
*Mabel Mooney, R.N.*
*Winifred Mooney, R.N.*
*Mrs. S. B. Packer, R.N.*
*Hsiu-lan Pai*
*Mary S. Purcell, R.N.*
*Ethel E. Robinson, R.N.*
*Mrs. Grace Rogers, R.N.*
*Bertha L. Sutton, R.N.*
*Lula Sweet, R.N.*
*Elizabeth Sze*
*Mabel E. Tom, R.N.*
*Faye I. Whiteside, R.N.*

## THE HOSPITAL AND PHYSICAL PLANT

*Donald E. Baxter, M.D.*, Superintendent. Hiram College. University of Louisville, M.D. Wide engineering and administrative experience. Director of New York Committee on After Care of Infantile Paralysis Cases. Worked on organization of hospitals under Red Cross in France.

*James S. Hogg*, Comptroller. Practiced civil engineering in Scotland until 1912. Member of the Construction Staff of the Provincial Secretary's Department, Ontario. Assistant Director of the Department of Soldiers' Civil Re-establishment with the Federal Government of Canada, 1917. Employed by W. B. Richards and Co., New York, 1919.

*Donald W. Salisbury, B.Sc.*, Assistant superintendent. Middlebury College, B.Sc. Formerly engineer and chemist of the General Carbonic Company, New York.

*George G. Wilson*, Superintendent of buildings and grounds. On staff of college under former management.

*Edward Watson*, Operating engineer.

*John Cameron*, Pharmacist. Qualified British pharmacist, with distinction in chemistry.

*E. Grace McCullough*, Dietitian. Studied at Washington School of Cookery, and Southern Homeopathic Medical College. Formerly dietitian, Massachusetts General Hospital, and Peter Bent Brigham Hospital, Boston. In 1913 investigated and reported on von Noorden Clinic, Vienna.

*Ernest Hall*, Assistant comptroller. Assistant accountant, Shanghai-Nanking Railway, 1905–1910. Chief accountant, Canton-Kowloon Railroad, 1910–1914. Managing Director "Chinese Products Ltd.," 1919–1920.

*E. Pauline Richardson, A.B.*, Assistant dietitian. University of Kansas, A.B., 1914. Diet technician, Peter Bent Brigham Hospital, Boston, 1914–1917. Dietitian, U.S. Army Base Hospital No. 23, 1917–1919. Dietitian, U.S. Naval Hospital, Bremerton, Wash., June, 1919–June, 1920.

*H. C. Mao*, Accountant.

*Yin-dah Hsü, Ph.C.*, Assistant pharmacist. Yale College in China, 1911–1916. University of Maryland, Ph.C., 1918.

### OTHER OFFICERS

*Ida Pruitt*, Hospital social service worker. Cox College. Teachers College, Columbia University. Teacher, Orphans' Home, Dobbs Ferry, N.Y. Principal, Girls' Grammar School, Chefoo, Shantung, China. Social service case worker, Philadelphia Society for Organizing Charity.

*Mary A. Cook, A.B.*, Librarian. University of Rochester, 1905–1907. Columbia University Library School, 1907–1908. University of Wisconsin, A.B., 1913. Reference librarian, University of Wisconsin, 1913–1914. Columbia University: library order department, 1915–1916; librarian, School of Journalism, 1916–1919

### RESIDENT STAFF (1920–1921)

*George W. Van Gorder*, Resident in surgery, and associate.

*Chi-cheng Liu*, Assistant resident in medicine.

*Ts-tswang Dzen*, Assistant resident in ophthalmology.

*Ying-keng Ch'ang*
*Lee-chang Chu*
*Chung-hsin Han*
*Shih-en Kao*
*Yu-tien Lee*
*Wen-ping Ling*
*Kuo-chih Liu*
*Ta-chün Yang*

PUBLICATIONS. The following is a partial list of articles published or submitted for publication by staff members who were in Peking in June, 1920:

Harvey J. Howard, M.D.

A test for the judgment of distance. *American Journal of Ophthalmology*, Sept., 1919.
Judgment of distance with semaphores and a screen at 100 meters. *Archives of Ophthalmology*, Sept., 1919.
A six meter stereoscope. *American Journal of Ophthalmology*, Dec., 1919.
A stereomicrometer, or an instrument of precision for measuring stereopsis. *Transactions of the American Ophthalmological Society*, 1919.
A new apparatus for testing accommodation. *Archives of Ophthalmology*, March, 1920.
Health education in schools of higher learning in China (in collaboration with W. G. Lennox and E. T. Hsieh). *China Medical Journal*, March, 1920.
The selection of men for aviation service. *Journal of the National Medical Association of China*, March, 1920.
Tenotomy of the inferior oblique. *Archives of Ophthalmology*, March, 1920.
A uniform system of eye tests. *China Medical Journal*, May, 1920.
The origin of the vitreous. *China Medical Journal, anatomical supplement*, July, 1920.

John H. Korns, M.D.

Examination of household servants for communicable disease. Preliminary report, *China Medical Journal*, Nov., 1920.
Treatment of chronic morphinism. *China Medical Journal*, Nov., 1919.

W. G. Lennox, M.D.

A case of cretinism (in collaboration with B. E. Read). *China Medical Journal*, March, 1920.
Syphilis of the central nervous system among Chinese; incidence, report of cases, and treatment. *China Medical Journal*, in press.
The health of missionaries in China. *Chinese Recorder*, Sept., 1920.

T. M. Li, M.D.

Practical considerations in refraction. *Journal of the National Medical Association of China*, June, 1920.

J. Heng Liu, M.D.

Incidence of abdominal diseases among Chinese. *Journal of the National Medical Association of China*, March, 1920.
Iso-agglutination tests on 1000 Chinese bloods. *Journal of the National Medical Association of China*, in press.

J. Hua Liu, M.D.

Comparative anatomy of the mastoid region. *China Medical Journal*, in press.

Fig. 94.—One of the rooms of the library in the chemistry building

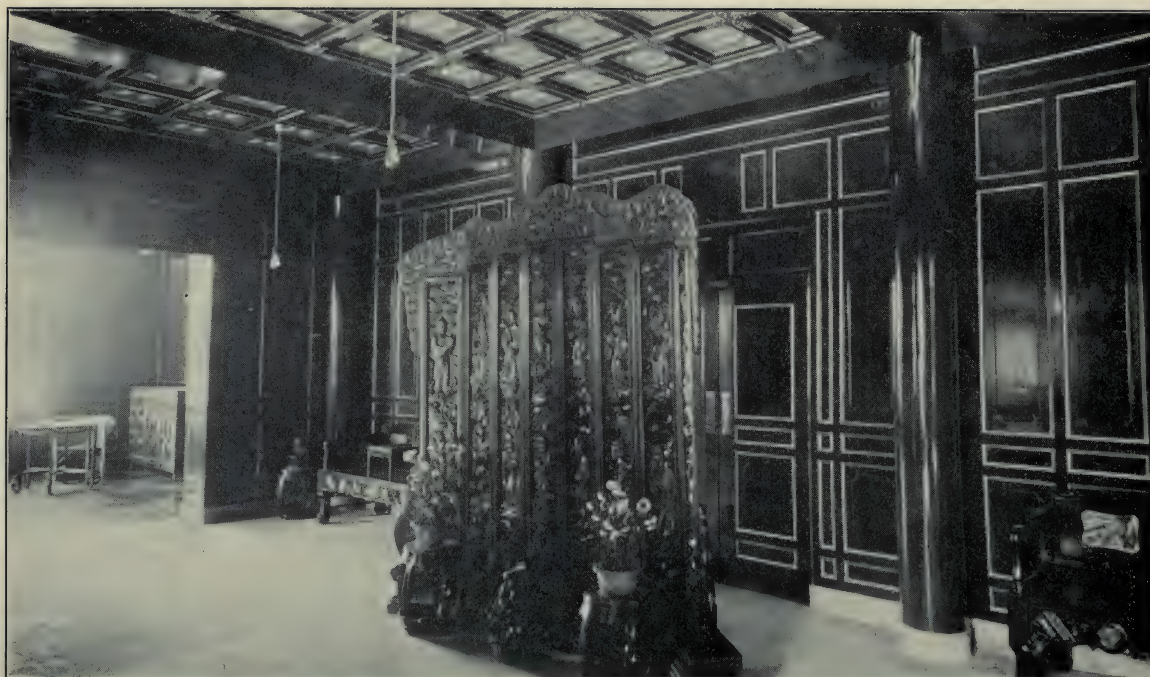

Fig. 95.—Lobby of nurses' home, showing Chinese interior and decorative screen

WAY-SUNG NEW, M.D.

The use of boiled bone as transplants in tuberculosis of spine and as internal splints in reduction of fractures. *Journal of the National Medical Association of China*, March, 1920.

PI HUA TEH, M.D.

Ancient Chinese treatment of eye diseases. *Journal of the National Medical Association of China*, in press.

RICHARD H. P. SIA, M.D.

Routine Wasserman tests on 502 in-patients. *China Medical Journal*, Jan., 1921.

H. JOCELYN SMYLY, M.D.

The treatment of syphilis. *China Medical Journal*, Nov. 1919.

A study of 35 cases of typhoid and paratyphoid. *China Medical Journal*, March, 1920.

EDGAR T. H. TSEN, M.D.

Notes on the etiology of the last cholera epidemic. *National Medical Journal of China*, March, 1920.

Bacillus pyocyaneus infection: report of a case. *China Medical Journal*, July, 1920.

## B. Aid to Other Medical Schools

The original plans of the Rockefeller Foundation and its China Medical Board had contemplated the erection of a medical school at Shanghai. When it was decided not to proceed with this project the following announcement was issued by the Foundation:

The Rockefeller Foundation announces that owing to changes in the world situation growing out of the war, it has felt impelled to set aside the purpose previously announced of establishing a medical school in Shanghai.

The purpose of the Foundation in China is to aid through its China Medical Board in developing, in co-operation with existing agencies, a comprehensive system of scientific medicine. With this in mind, two medical schools of high grade were originally planned: the first in Peking,


Fig. 96.—Map of China, showing medical institutions aided by the China Medical Board (in addition to the Peking Union Medical College, supported in full)

where a missionary medical school, the Union Medical College, was to be taken over; and the second in Shanghai. In addition, a program has been followed during the past five years which included appropriations toward increasing the staffs, buildings and equipment of a number of mission hospitals, toward strengthening the pre-medical work of a few existing colleges and universities, and toward advanced training of Chinese and missionary physicians.

The Peking Union Medical College was opened in the autumn of 1919. A two hundred and fifty bed hospital and ample buildings for laboratory and teaching purposes will be completed during the coming winter, and a staff comprising both Chinese and Western teachers trained in modern scientific medicine is already assembled at Peking. The formal dedication of the buildings will take place in the autumn of 1921. Grants have been made also to medical schools at Changsha and Tsinan. The establishment of the school in Shanghai was postponed until the Peking Union Medical College buildings should be near completion and the faculty assembled. When the Shanghai Medical School project was again considered, the world situation had greatly changed. The war has created new needs and new opportunities for aid in Europe. A consideration of world needs in medicine and public health makes it seem inadvisable for the Rockefeller Foundation to establish and maintain a second modern medical school in China, with the responsibilities for expense and trained medical personnel which this involves.

The Foundation expects to continue to co-operate through the China Medical Board with hospitals and pre-medical courses in important centers in China, and will continue the development of the Peking School in accordance with the high standard it has set for itself. It is hoped that this school will be a useful contribution to the progress of modern medicine throughout the entire country.

The China Medical Board has aided in the educational work of a few medical schools which are administered by other organizations. By the end of 1920 the total amounts appropriated to these schools were:

| | |
|---|---|
| Harvard Medical School of China[1] | $15,000 |
| St. John's University of Pennsylvania Medical School | 6,000 |
| Shantung Christian University | 191,763 |
| Hunan-Yale Medical School | 140,902 |
| Red Cross Hospital, Shanghai[2] | 65,101 |
| TOTAL | $418,766 |

[1] Closed in 1916.
[2] Closed in 1918.

## II. PRE-MEDICAL EDUCATION

### A. Peking Pre-Medical School

With the undertaking of medical education in Peking the problem of adequate preparation of students became serious. A good grounding in the English language and in the sciences of physics, chemistry, and biology is essential for modern medical work. As yet the schools and colleges in the vicinity of Peking are not prepared to provide this fundamental training. They have not the necessary laboratories and equipment, nor the specialized teaching faculties. The Trustees therefore decided to open a pre-medical school in connection with the Peking Union Medical College. It is hoped that pre-medical instruction will soon be offered by other agencies, and that the Board will be able to give up this branch of its work.

The pre-medical school opened in the autumn of 1917. Originally a two-year course was planned, but it has recently seemed necessary to add a third year to the course. The subjects taught are biology, chemistry, physics (including a certain amount of higher mathematics), English, and Chinese. The last two years of the work are of strictly college grade. Thirty-four students were enrolled during 1919–1920 and

fifty-nine during 1920–1921. On graduation from the pre-medical department a certificate is issued which entitles the holder to enter the medical school without further examination.

PERSONNEL. The present faculty of the pre-medical school is composed of eleven American and five Chinese teachers, as follows:

### THE PRE-MEDICAL SCHOOL

*William Warren Stifler, A.B., A.M., Ph.D.*, Assistant professor of physics, in charge of department, and dean. Shurtleff College, A.B., 1902. University of Illinois, A.M., 1908; Ph.D., 1911. Instructor in physics, Columbia University, 1911–1916.

*Stanley D. Wilson, A.B., A.M., Ph.D.*, Assistant professor of chemistry, in charge of department. Wesleyan University, A.B., 1909; A.M., 1910. University of Chicago, Ph.D., 1916. Instructor in organic chemistry, Rice Institute, Houston, Texas, 1916–1917.

*Charles Packard, B.S., M.S., Ph.D.*, Assistant professor of biology, in charge of department. Syracuse University, B.S., 1907; M.S., 1908. Columbia University, Ph.D., 1914. Instructor in biology, Columbia University, 1914–1918.

*Adolf Eduard Zucker, A.B., A.M., Ph.D.*, Assistant professor of modern European languages, in charge of department. University of Illinois, A.B., 1912; A.M., 1913. University of Pennsylvania, Ph.D., 1917. Formerly teacher of French and German, Tsing Hua College, Peking.

*K. M. Ma, Hsui-ts'ai*, Instructor in Chinese, in charge of department. Formerly taught in preparatory department of Government University at Peking.

*Bird R. Stephenson, A.B., M.S.*, Instructor in physics. Albion College, Michigan, A.B., 1914. University of Illinois, M.S., 1917. Assistant in physics, University of Illinois, 1917–1918.

*Aura Severinghaus, B.S., A.M.*, Instructor in biology. University of Wisconsin, 1912–1915, major zoology. Columbia University, B.S., A.M. Has completed work for Ph.D., at Columbia University. Assistant in zoology, Columbia University, 1916–1917, 1919–1920.

*Helen R. Downes, A.B., M.S.*, Instructor in chemistry. Columbia University, A.B., 1914; M.S., 1918. Teacher of chemistry, Vassar College, 1914–1916; Barnard College, 1916–1918.

*Emily Tilly*, Instructor in modern European languages. Educated in Great Britain, Germany, and the United States. Course in phonetics, Columbia University, 1919–1920. Teacher of German phonetics at Tilly Institute, Germany. Teacher of German and French, Holy Angels' Academy and D'Youville College, Buffalo, 1916–1919.

*C. T. Feng*, Assistant in chemistry. Assistant in chemistry at the Union Medical College, 1915–1916. Postgraduate course in chemistry at Weihsien, 1916–1917.

*Paul C. T. Kwei, A.B., M.S.*, Assistant in physics. Yale University, A.B., 1917. Cornell University, M.S., 1920. Instructor in English, Tsing Hua Middle School, 1913–1914.

*Edna M. Wolf, Ph.B., M.S.*, Assistant in biology. Hamline University, Ph.B., 1911. University of Minnesota, M.S., 1919; courses in general physiology and physiological chemistry, 1919–1920. University of Minnesota: assistant in general chemistry, 1918–

1919; research assistant, summer of 1919; assistant in zoology, 1919–1920.

*Ewing C. Scott, A.B.*, Assistant in chemistry. Leland Stanford Jr. University, A.B., 1916 (specialized in chemistry). University of California, postgraduate work towards Ph.D. in chemistry. Teacher of elementary chemistry, University of California, 1916–1917. Research work and instructor, U.S. Army, chemical warfare service, 1917–1919. Chemist, Phelps Dodge Corporation, Morenci, Arizona, 1920.

*A. S. Hogenauer, A.B.*, Assistant in modern European languages. College of City of New York, A.B., 1920.

*C. M. Yü*, Assistant in Chinese.

*I. F. Yü*, Assistant in chemistry.

### B. Aid to Pre-Medical Education in Other Institutions

In an effort to strengthen pre-medical education the China Medical Board has also helped several institutions which already possessed departments of science and were giving what scientific preparation they could to the students who desired to enter Peking Union Medical College and other medical institutions of good standing. Five such institutions are the Canton Christian College, the pre-medical department of Hunan-Yale Medical School, the Fukien Christian University, Ginling College for Women, and St. John's University.

## III. OTHER ACTIVITIES

### A. Aid to Hospitals

From the beginning of its work, the China Medical Board has been interested in the development of mission hospitals, and on invitation has shared in certain instances in increasing the staffs, enlarging the buildings, and supplying new equipment for a few strong, strategically situated hospitals. To date, grants have been made to thirty-three hospitals. For hospital appropriations, together with loss by exchange, the payments for the year 1920 were approximately $64,250.

The first hospital under strictly Chinese auspices to receive a grant from the China Medical Board is the Peking Central Hospital, which has been given $5,000 a year for three years, plus $3,000 for equipment. This is a new, 120-bed hospital, built and equipped entirely through funds subscribed by Chinese, and is under Chinese management. The income is for the most part derived from contributions received from railway, government, and private sources. The institution appeared to offer a favorable opportunity to test on a small scale a purpose that had long been entertained,—that of aiding, when

possible, medical work wholly under Chinese auspices.

### B. Fellowships and Scholarships

Pending the opening of the Peking Union Medical College, a number of fellowships for study in the United States have been granted to both Chinese and missionary physicians and nurses. It is hoped that when the Peking school is fully established the fellowships may be reduced in number, and that only specially qualified men will be sent to the United States for graduate work in advanced subjects which the Peking college may not be so well prepared to offer as some of the schools in the United States.

During the past year, twenty-seven medical missionaries and nurses on furlough, eleven Chinese graduate students, eight Chinese undergraduate medical students, and four Chinese nurses studied in America and Great Britain with the aid of fellowships which aggregated $29,095.25. Fig. 97 shows by years the number of fellowships and scholarships that have been granted, the total payments made on them, and the pledges for future years.

The following is a list of persons who have studied in America and Great Britain during the past year under fellowships from the Board:

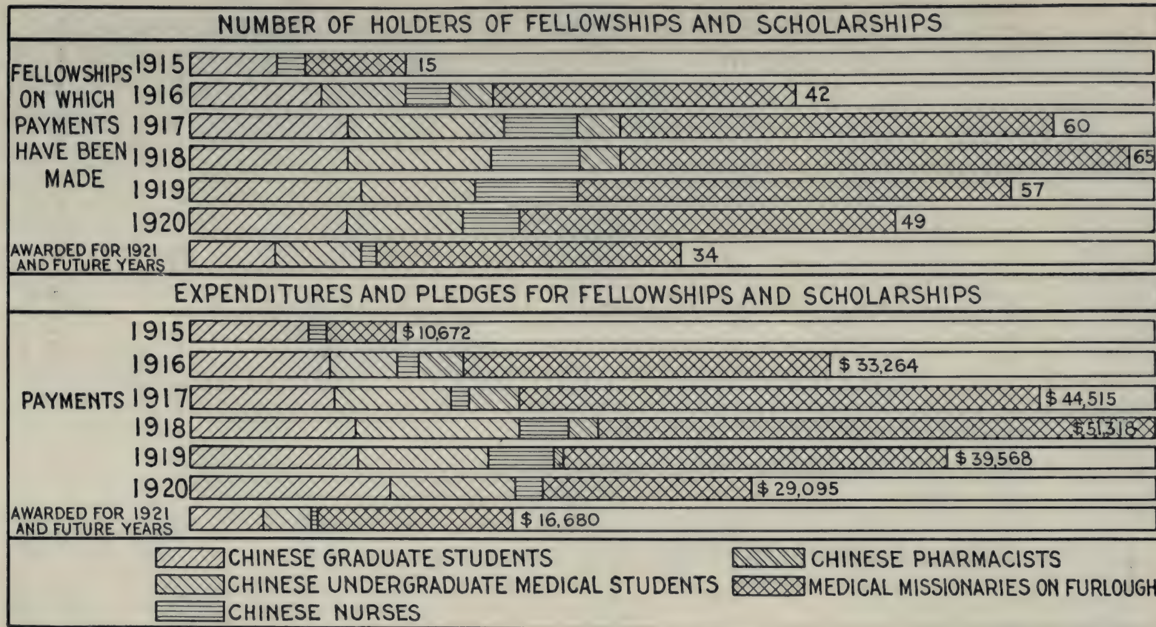


Fig. 97.—Number of fellowship and scholarship holders, by years, since creation of China Medical Board, with amounts expended or pledged

Fig. 98.—One of the private laboratories in pathology building

## MISSIONARY DOCTORS AND NURSES

*Claude Heman Barlow, M.D.*, Shaohsing Christian Hospital. Studied parasitology at Johns Hopkins University.

*Emilie Bretthauer, M.D.*, Northern Baptist Hospital, Suifu. Attended general lectures and clinics at the New York Post-Graduate Medical School and Hospital.

*Harry Lee Canright, M.D.*, West China Union University, Chengtu. Studied anatomy, obstetrics, and allied subjects at the University of Michigan.

*Samuel Cochran, M.D.*, Shantung Christian University. Studied bacteriology at the College of Physicians and Surgeons.

*Frederick E. Dilley, M.D.*, Peking Union Medical College. Studied ear, nose, and throat at Harvard Medical School.

*F. P. Gaunt, M.D.*, Wuhu General Hospital. Studied genito-urinary diseases at Harvard Medical School.

*G. L. Hagman, M.D.*, Nantungchow Christian Hospital, Kiangsu. Studied surgery at Harvard Medical School.

*Frances J. Heath, M.D.*, Union Medical College for Women, Peking. Studied diagnostic and surgical methods at Harvard Medical School.

*A. R. Kilgore, M.D.*, Formerly Red Cross General Hospital, Shanghai. Studied surgery at Johns Hopkins University.

*Charles D. Leach, M.D.*, Huchow Union Hospital. Studied at the ear infirmary of the Boston Charitable Ear and Eye Infirmary.

*George Walne Leavell, M.D.*, Stout Memorial Hospital, Wuchow, Kwangsi. Studied clinical medicine and hospital administration at Johns Hopkins University.

*Percy Campbell Leslie, M.D.*, Canadian Presbyterian Hospital, Changteho. Took a general course at the New York Post-Graduate School and a course in ophthalmology at the New York Ear and Eye Infirmary.

*Walter E. Libby, M.D.*, Wuhu General Hospital. Studied pathology and clinical microscopy at Johns Hopkins University.

*George D. Lowry, M.D.*, Methodist Hospital, Peking. Took a general course at New York Post-Graduate Medical School.

*Emma E. Martin, M.D.*, Isabella Fisher Hospital, Tientsin. Studied physical diagnosis at Harvard and at the Mayo Clinic, Rochester, Minn.

*Richard Howard Mole, M.D.*, Mukden Medical College. General study at Mayo Clinic, Rochester, Minn., and work in cystoscopy and pathology at the New York Post-Graduate Medical School.

*Myra L. Sawyer*, Williams Porter Hospitals. Hospital observation in Detroit and Boston.

*T. Dwight Sloan, M.D.*, University Hospital, Nanking. Studied neurology at Johns Hopkins and pediatrics at Harvard Medical School.

*Ada B. Speers, M.D.*, Women's Hospital, Canadian Methodist Mission at Chengtu. Studied at the Toronto General Hospital.

*Sada Collins Tomlinson*, Men's Hospital of the American Episcopal Mission, Anking. Studied nursing and administration at Teachers College.

*C. E. Tompkins, M.D.*, Suifu Baptist Mission Hospital. Studied diseases of the digestive tract at Cornell University Medical School; visited Mayo Clinic; studied water analysis and rabies at the University of Michigan.

*George T. Tootell, M.D.*, Northern Presbyterian Hospital, Changteh. Studied at the Chicago Lying-in Hospital and at the Harvard School of Tropical Medicine.

*Charles Garnet Trimble, M.D.*, Alden Speare Memorial Hospital, Yenping. Studied diagnosis in the surgical department of the Presbyterian Hospital, New York.

*Augustine W. Tucker, M.D.*, St. Luke's Hospital of the American Episcopal Mission, Shanghai. General study and a course in fractures and operative surgery at New York Post-Graduate Medical School.

*Fred J. Wampler, M.D.*, Church of the Brethren Hospital, Pingtingchow. Studied parasitology at Harvard Medical School.

*Marguerite D. Warfield*, Hunan-Yale Hospital, Changsha. Studied nursing and hospital administration at Teachers College.

*James M. Wright, M.D.*, Canton Hospital. Studied at Massachusetts General Hospital; general course and work in obstetrics and gynecology at the New York Post-Graduate Medical School and Hospital; studied at the New York Lying-in Hospital and at the Mayo Clinic, Rochester, Minn.

## CHINESE GRADUATE STUDENTS

*Edward Young Kau, M.D.*, Harvard Medical School of China. Studied at the Hospital for the Ruptured and Crippled, New York.

*Kwang-hsun Li, M.D.*, Polyclinic Hospital, Philadelphia. Studied pediatrics at Harvard.

*Chong-eang Lim, M.D.*, Peking Central Hospital. Studied public health and bacteriology at Johns Hopkins University and studied at the School of Tropical Medicine, Liverpool, England.

*Chi-cheng Liu, M.D.*, Peking Union Medical College. Studied internal medicine at Washington University, St. Louis, and University of Chicago. Appointed assistant resident, department of medicine, Peking Union Medical College, July 1, 1920.

*Wen-chao Ma, M.D.*, Union Medical College, Peking. Studied anatomy and biology at the Marine Biological Laboratories, Woods Hole, Mass., and anatomy at the University of Chicago.

*Mary Tai, M.D.*, Women's and Children's Hospital, Nanchang. Course in dissection at Bellevue Hospital Medical School; resident in obstetrical department of Worcester Memorial Hospital; general course at the New York Post-Graduate Medical School.

*Yao Wong, M.D.*, Hunan-Yale Medical School, Changsha. Studied pathology at Harvard Medical School and at Peter Bent Brigham Hospital, Boston.

*Sze-dau Tsiang, M.D.*, Church General Hospital, Wuchang. Studied surgical diagnosis and pathology at Harvard Medical School.

*Lan-sung Woo, M.D.*, St. Luke's Hospital, Shanghai. Studied at Harvard Medical School and out-patient department, Children's Hospital, Boston.

*Hsien Wu, B.S.*, Harvard Medical School. Studied biological chemistry at Harvard Medical School.

*Zung-dau Zau, M.D.*, Red Cross General Hospital, Shanghai. Externe, Boston City Hospital.

## CHINESE UNDERGRADUATE STUDENTS

*Sheo-nan Cheer, M.D.*, June, 1920, Johns Hopkins Medical School. Entered Massachusetts General Hospital as interne in September, 1920.

*Tze King, M.D.*, June, 1920, Harvard Medical School. Commenced interneship Boston Consumptives' Hospital, in July, 1920.

*Wen-ping Ling, M.D.*, June, 1920, Harvard Medical School. Appointed interne, Peking Union Medical College, July 1, 1920.

*Ven-tsao Loh, M.D.*, June, 1920, Harvard Medical School. Commenced interneship Barnes Hospital, St. Louis, Mo., in July, 1920.

*Long-teh Tso (Ernest Tso), M.D.*, Harvard Medical School. Interne, Boston City Hospital. Returned to China in spring of 1920.

*Shu-tai Woo, M.D.*, Harvard Medical School. Interne, Massachusetts General Hospital.

*Chen-hsiang Hu.* In senior year at Harvard Medical School, Boston, Massachusetts.

*Cheuk-shang Mei.* In senior year at College of Physicians and Surgeons, New York.

## CHINESE NURSES

*Mabel Mooney*, Red Cross General Hospital, Shanghai. Massachusetts General Hospital, Boston.

*Winifred Mooney*, Massachusetts General Hospital. Wesson Maternity Hospital.

*Elizabeth Sze*, Mary Black Hospital, Soochow. Johns Hopkins Hospital.

*Zing-ling Tai*, Peter Bent Brigham Hospital, Boston.

### C. Miscellaneous

Medical Conference at Peking. During the week ending February 28, 1920, the China Medical Missionary Association and the National Medical Association of China held their biennial conferences in the new buildings of the Peking Union Medical College. A very full program had been arranged and a successful effort was made to emphasize the professional papers and discussions rather than the business sessions. Most of the time, apart from the sectional meetings, was devoted to discussion of the needs of mission hospitals, upon which Dr. H. Balme, of Tsinanfu, had prepared a very thorough report.

Among the foreign visitors not connected with either of the two associations were Dr. Ales Hrdlicka, of the Smithsonian Institution, Washington, D.C.; Drs. M. Inouye and S. Ono, of the Imperial University of Tokyo; Dr. H. S. Earle, Dean of the Medical School of Hongkong University; and Dr. Poupelain of the French navy, who had been doing research work in Szechuen province and teaching in the provincial medical school at Chengtu.

Survey of Middle Schools and Colleges for Prospective Medical Students. The National Medical Association of China began, in December, 1919, in co-operation with the China

Medical Board and at the request of Mr. Roger S. Greene, Resident Director of the Board, a survey of the middle schools and colleges of China, both government and private; while the China Medical Missionary Association, at the close of 1920, was preparing to undertake a similar survey of missionary medical schools. In the former investigation 817 questionnaires were mailed. Largely owing to the unsettled conditions in the country, only 24 per cent of the questionnaires had been returned by December 31, 1920. However, the number of students covered by the returns was 36,095. Of these, 1,153 (3.11 per cent) expressed an intention to study medicine. Dr. C. V. Yui, who compiled the report, states: "The survey seems to indicate that if China is to possess within a reasonable time a medical profession composed of scientifically qualified Chinese physicians in strength sufficient to cope with the medical needs of the country, attention must be directed not wholly to the number and condition of our medical schools; it is also necessary to take measures to induce a much larger number of Chinese students to study medicine than is shown by the present investigation."

Medical Terminology. China has not as yet a standardized medical terminology. Committees of the China Medical Missionary Association and of the National Medical Association

have been working for some years on this problem. The Publication Committee of the China Medical Missionary Association has translated, and published in Chinese, standard text books for use in medical schools. The China Medical Board, in accordance with a former grant, contributed Mex. $10,000 for the translation of medical terminology during 1920.

A conference on this subject was held at Peking Union Medical College in July, 1920. At this session the bacteriological terms were provisionally finished. Considerable progress has been made with chemistry and physics, but the former has presented special difficulties, owing to the necessity of finding altogether new terms for organic chemistry.

### D. The Board

The Board has held during the year three stated meetings, in addition to two special Board meetings and numerous meetings of the Executive Committee. Early in the spring the Resident Director in China, Mr. Roger S. Greene, returned to the United States for a few weeks, to attend the meetings of the Board held in April and May.

# DIVISION OF MEDICAL EDUCATION

## Report of the Director

To the President of the Rockefeller Foundation:

Sir:

I have the honor to submit herewith my report as Director of the Division of Medical Education for the period January 1, 1920, to December 31, 1920.

Respectfully yours,
RICHARD M. PEARCE,
Director.

# DIVISION OF MEDICAL EDUCATION

In December, 1919, the Foundation created a Division of Medical Education to assume direction of its rapidly expanding program for aiding in the development of medical education throughout the world. This new division is charged with studying medical education and with assisting in promoting it as important opportunities offer. The United States is excluded from its program by reason of the fact that the work of the General Education Board embraces the promotion of education, including medical education, in this country. The Division, undertakes surveys and studies of conditions in medical education in other countries throughout the world; makes recommendations to the Foundation that it participate in the development of medical education in these countries; undertakes the execution of its ideas; gives counsel in connection with the special work which the China Medical Board has been carrying on since December, 1914; arranges courses of study in America for the large and increasing numbers of medical fellows who are coming from many lands; and assumes other duties of similar nature assigned it from time to time.

During the year 1920 the chief activities of the Division were: (I) the carrying out of a program

for advancing medical education in Canada; (II) participation in the further development of a medical center in London; (III) the extension of aid to the medical department of the University of Brussels; and (IV) study of the medical situation in China.

### I. Canadian Medical Program

In a statement accompanying his gift of December, 1919, the Founder referred to the residents of the United States and Canada as neighbors, bound closely together by ties of race, language, and international friendship. He emphasized the sacrifice of youth and resources which the Canadian people had made unstintingly in the late war and expressed the hope that a part of his gift might be used for developing medical education in Canada. Accordingly, the sum of $5,000,000 was set aside for use in that country. Conferences were arranged with Canadian medical school authorities, government officials, and other citizens, in an effort to obtain their ideas as to the best method to be pursued in distributing this appropriation; and as a result of studies made by the President of the Foundation and the Director of the Division of Medical Education, a dominion-wide policy was proposed.

It was felt that the needs of Canada in the field of medical education could be supplied by seven

strong schools: (1) Dalhousie, at Halifax; (2) McGill, at Montreal; (3) Toronto, at Toronto; (4) Manitoba, at Winnipeg; (5) British Columbia, at Vancouver; (6) a school for the French Canadians at Montreal; and (7) a school for northwestern Canada at Edmonton, Alberta. The first five schools give a geographical distribution across the continent; the sixth cares for the French Canadian population; and the seventh for the rapidly developing Northwest. With the exception of the school at Vancouver—plans for the development of which have not yet been fully matured—the Foundation worked out with each of the above strategically situated schools a general program of development to be carried out over a number of years, which includes provision for progress in buildings and equipment, in hospital and other clinical facilities, and in methods, as well as for the strengthening of personnel. Appropriations toward projected developments, involving large additional sums from other sources, were then made as follows:

| | |
|---|---|
| McGill University, Montreal | $1,000,000 |
| University of Toronto | 1,000,000 |
| University of Manitoba | 500,000 |
| Dalhousie University | 500,000 |
| Reserved for future allocation | 2,000,000 |
| Total | $5,000,000 |

From the income of the reserve, gifts of $25,000 each for current expenses of the year were made

to the *Université de Montréal* and to the University of Alberta, both in process of reorganization.

### II. Development of London Medical Center

During 1919 and 1920 a brief survey of medical education and public health administration in Western Europe was made by the Director of the Division of Medical Education and the General Director of the International Health Board. The study in London disclosed an interesting and important situation. Interest in the *full-time*, or *unit*, plan had been aroused, and in four of the London schools at the time of the visit the plan was on trial but under conditions which did not guarantee success. It was important that in one school at least the plan should be tried out under the best possible circumstances as to staff, number of beds, laboratory equipment, and financial support. After a careful study it was decided that the University College Hospital Medical School more closely approached the conditions necessary to insure the success of the newer methods of clinical teaching than did any other school in London. To accomplish this result and to make this institution an outstanding example for English medical schools, it was necessary that there should be provided a modern institute of anatomy; additional means for the departments of anatomy, physiology, and

Fig. 99.—A children's ward, University College Hospital

Fig. 100.—New anatomy building, University College, University of London

pharmacology; one hundred endowed beds and the necessary clinical laboratories, for teaching purposes, in the hospitals; that the obstetric unit should be endowed; that a laboratory for pathological chemistry should be established; and that there should be augmented support for full-time teaching and research.

A commission from University College and from University College Hospital Medical School visited the United States and discussed its plans at length with officers of the Foundation. The result was the drawing up of agreements looking toward Foundation co-operation. The contracts provide that toward the proposed program the Foundation shall donate for University College, 190,000 pounds for buildings and equipment and 180,000 pounds for endowment; and for University College Hospital, 400,000 pounds for buildings and equipment and 435,000 pounds for endowment, making a total from the Foundation of approximately $4,000,000 toward the entire plan of development.

### III. Aid to University of Brussels

The study made in 1919-1920 of medical education in Western Europe included a survey of conditions in Belgium. The importance of aiding development in the medical school of the University of Brussels was recognized, but no

action was recommended pending the completion by the authorities in Brussels of their plans for reorganization. When these plans had taken definite shape a delegation came to the United States to present them and to discuss them at length. The proposals for rebuilding and reorganizing the medical school included the construction by the city of Brussels of a new city hospital, and the erection by the University of a school for nurses and a students' club, with endowment for maintenance. The Foundation, as its share, was invited to supply funds for the construction and equipment of laboratories and teaching buildings, with endowment for maintenance, as well as to provide an endowment to meet a proposed increase in faculty salaries. The Foundation thereupon pledged itself to contribute toward this enterprise, which will involve altogether approximately 100,000,000 francs, the sum of 40,000,000 francs.

### IV. Medical Education in China

Medical education in China has been since 1915 the special concern of the China Medical Board. A report of the work of that Board is included in this volume.

During 1920 the Director of the Division of Medical Education spent several months in Peking, studying the problems of medical edu-

Fig. 101.—Physiology, chemistry, and anatomy buildings (nearing completion). Peking Union Medical College

Fig. 102.—One of the laboratories of Peking Union Medical College

cation in China and their bearing on conditions throughout the world. He acted as counsel to the Director of the Peking Union Medical College and for a short time was Acting Director of the School.

### V. Miscellaneous

In addition to these larger activities the Division has given service in the important work of placing men who hold fellowships from the International Health Board and the China Medical Board. These men come from various countries and are carefully selected not only on the basis of their preliminary training but also with a view to their fitness for assuming, after special study in their particular fields, positions as teachers, investigators, or administrators in important institutional or government service in their own countries. A careful study is made of each individual's requirements, and courses of study are planned to meet his particular needs.

During the year commissions were brought to the United States as guests of the Foundation, to visit medical centers and make studies of medical education and methods. One such commission came from England and another from Belgium, and an invitation has been extended to Serbia to send a commission in 1921.

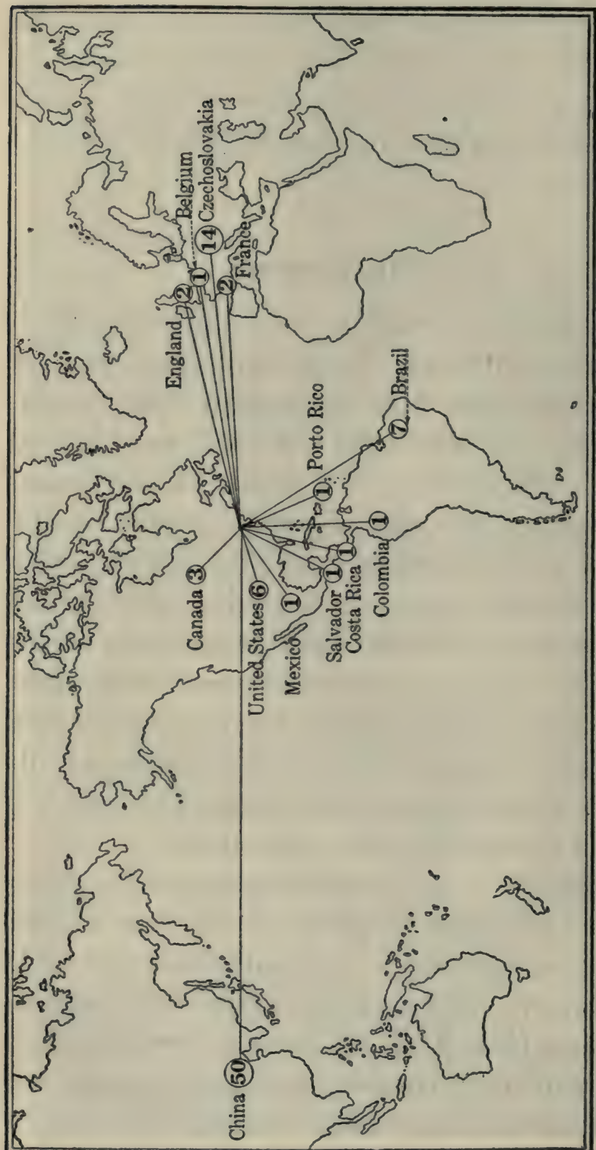


Fig. 103.—Ninety individuals representing thirteen different countries received fellowships, from the Rockefeller Foundation during 1920. The map shows the countries from which the students came

The Secretary of the Foundation visited the chief medical centers of Central Europe during the summer of 1920. At every university visited an urgent desire was expressed for British and American research journals. The war and the ensuing unfavorable rates of exchange had made it almost impossible to obtain these journals since 1915. It was decided to supply them to the universities in all European countries which were suffering from adverse exchange rates, the agreement providing that the Universities should pay for the journals in the national currency of their country at the pre-war rates of exchange, the Foundation to make up the difference due to depreciation in exchange.

Moreover, in all the universities of Central Europe equipment that had usually been replenished year by year (such as chemicals, and glassware, rubber, and similar scientific apparatus) had, during the four years of war and the two years of disorganized conditions that followed it, either been very largely consumed or altogether destroyed, while conditions of finance and exchange made it almost impossible for the universities to replace this equipment. Accordingly, the Foundation agreed to help four or five of the more important medical centers to obtain these necessary supplies, and appropriated for this purpose a total of $100,000.

# THE ROCKEFELLER FOUNDATION

## Report of the Treasurer

New York, February 9, 1921

To the President of the Rockefeller Foundation:

Sir:

I have the honor to submit herewith my report of the financial operations of the Rockefeller Foundation and its subsidiary organizations for the period January 1, 1920, to December 31, 1920.

Respectfully yours,

L. G. MYERS,

Treasurer.

## TREASURER'S REPORT

Income from principal funds and from funds temporarily invested, exclusive of income from special funds, amounted to $8,727,730.05. The balance of income from the previous year, after adding sundry refunds, was $4,554,442.61. A total of $13,282,172.66 was thus available for disbursement, of which the sum of $7,077,856.27 was disbursed, leaving a balance of $6,204,316.39.

Of this balance $4,558,521.98 is applicable to appropriations made in 1920 and prior years, and $1,645,794.41 is available for appropriation or for disbursement on account of appropriations payable in 1921.

Appropriations and pledges payable in 1921 amount to $9,710,009.44, while those that become effective in 1922 and subsequent years amount to $8,885,103.13.

Principal funds, including reserve fund, increased during the year from $174,186,828.46 to $174,432,713.06, a difference of $245,884.60. This represents gains on securities sold and redeemed, amounting to $398,617.60, less the sum of $152,733.00, which was appropriated from the fund received from the estate of the late Laura S. Rockefeller.

Income disbursed for land, buildings, and equipment during the year amounted to $2,806,790.29. The total amount disbursed to date is $7,801,256.13, but during the year the Grand Chenier tract was deeded to the State of Louisiana, and the cost thereof, amounting to $248,420.72, was written off the books, leaving the net amount carried as an asset in land, buildings, and equipment account at

$7,552,835.41. A detailed statement of the account will be found in Exhibit N.

Early in the year a final gift of $10,256.93 was received from the estate of the late Laura S. Rockefeller.

It will be noted in the accompanying balance sheet that on December 31, the Corporation was borrowing $1,800,000 and at the same time lending $1,450,000. This is explained by the fact that the moneys loaned were to be disbursed shortly after the close of the year, and it was deemed better to keep them in liquid form until needed rather than to repay loans and negotiate others later.

Since the close of the year the accounts of the Comptroller, the accounts of the Treasurer, and the securities owned by the Corporation have been examined by Messrs. Lybrand, Ross Bros., and Montgomery, Accountants and Auditors. They have rendered a satisfactory report of their work.

The financial condition and operations are set forth in the appended exhibits listed below:

| | |
|---|---|
| Balance Sheet | Exhibit A |
| Statements of Receipts and Disbursements of Income | Exhibit B |
| Foundation Appropriations: | |
| Medical Education | Exhibit C |
| Mental Hygiene | Exhibit D |
| Research in Physics and Chemistry | Exhibit E |
| School of Hygiene and Public Health | Exhibit F |
| War Work | Exhibit G |
| Miscellaneous | Exhibit H |

## EXHIBIT A

## BALANCE SHEET, DECEMBER 31, 1920

### ASSETS

| | | |
|---|---|---|
| I. INVESTMENTS | | |
| General Schedule (Exhibit P) | $179,279,807.74 | |
| Less amount of income invested (see below) | 4,963,894.68 | |
| | | $174,315,913.06 |
| Special Funds (Exhibit Q) | | 116,800.00 |
| | | $174,432,713.06 |
| II. LAND, BUILDINGS, AND EQUIPMENT (Exhibit N) | | $7,552,835.41 |
| III. INCOME ACCOUNTS | | |
| Income invested temporarily (Exhibit P) | | $4,963,894.68 |
| Funds in hands of agents, to be accounted for, and sundry accounts receivable | | 1,552,629.09 |
| Moneys loaned | | 1,450,000.00 |
| Cash on deposit | | 93,520.15 |
| | | $8,060,043.92 |
| Less | | |
| Moneys borrowed | $1,800,000.00 | |
| Accounts payable | 23,523.71 | |
| | | 1,823,523.71 |
| | | $6,236,520.21 |
| GRAND TOTAL | | $188,222,068.68 |

## EXHIBIT A

### BALANCE SHEET, DECEMBER 31, 1920

### FUNDS AND OBLIGATIONS

| | | |
|---|---|---|
| **I. Funds** | | |
| General Fund (Exhibit M)... | $171,204,624.50 | |
| Reserve Fund (Exhibit M)... | 3,111,288.56 | |
| | | $174,315,913.06 |
| Special Funds | | |
| Gift of John D. Rockefeller.. | $37,000.00 | |
| Gift of Laura S. Rockefeller. | 49,300.00 | |
| Henry Sturgis Grew Memorial Fund.............. | 25,000.00 | |
| Arthur Theodore Lyman Endowment.............. | 5,500.00 | |
| | | 116,800.00 |
| | | $174,432,713.06 |
| **II. Land, Buildings, and Equipment Fund** | | |
| Appropriations from income (Exhibit N)............. | | $7,552,835.41 |
| **III. Income Accounts** | | |
| Estate Laura S. Rockefeller Fund (Exhibit B)......... | | $28,753.63 |
| Henry Sturgis Grew Memorial Fund Income (Exhibit B).. | | 2,984.33 |
| Arthur Theodore Lyman Endowment Fund Income (Exhibit B).............. | | 465.86 |
| [1] Balance due on appropriations payable in 1920 and prior years (Exhibit K)...... | | 4,558,521.98 |
| Income in excess of appropriations payable in 1920 and prior years............... | | 1,645,794.41 |
| | | $6,236,520.21 |
| **Grand Total**............ | | $188,222,068.68 |

[1] In addition to this figure there are appropriations and pledges amounting to $9,710,009.44 which become effective in 1921, and $8,885,103.13 which become effective in subsequent years. These liabilities are, for the purposes of this report, considered as charges against the income for the years in which they become payable.

## EXHIBIT B

## STATEMENTS OF RECEIPTS AND DISBURSEMENTS OF INCOME

### GENERAL FUND

#### Receipts

| | | | |
|---|---|---|---|
| Balance, December 31, 1919 | | $4,543,271.62 | |
| Refunds of payments made in prior years: | | | |
| The Rockefeller Foundation | $2,000.00 | | |
| China Medical Board | 14.18 | | |
| International Health Board | 9,156.81 | | |
| | | 11,170.99 | $4,554,442.61 |
| Income from principal funds and from income invested temporarily | | | 8,727,730.05 |
| | | | $13,282,172.66 |

#### Disbursements

| | | | |
|---|---|---|---|
| International Health Board (Exhibit I): | | | |
| Hookworm, malaria, and yellow fever work | $922,053.98 | | |
| Tuberculosis work in France | 522,459.50 | | |
| Medical education | 44,288.59 | | |
| Miscellaneous | 43,100.93 | | |
| Administration | 91,472.20 | | |
| | | $1,623,375.20 | |
| China Medical Board (Exhibit J): | | | |
| Medical Education: | | | |
| Peking Union Medical College: | | | |
| Land and buildings | $2,772,185.85 | | |
| Operation | 483,059.61 | | |
| Shanghai Medical School: | | | |
| Land and buildings | 22,797.43 | | |
| Operation | 1,010.81 | | |
| Unaffiliated medical schools | 58,537.50 | | |
| Pre-medical education | 142,805.75 | | |
| Hospitals of missionary societies | 62,221.47 | | |
| Translation of medical and nursing textbooks | 11,119.76 | | |
| Fellowships and scholarships | 29,095.25 | | |
| Miscellaneous | 2,500.00 | | |
| Administration | 56,262.47 | | |
| | | $3,641,595.90 | |
| *Amounts Forwarded* | | $5,264,971.10 | $13,282,172.66 |

EXHIBIT B—*Continued*

## STATEMENTS OF RECEIPTS AND DISBURSEMENTS OF INCOME

## GENERAL FUND

| | | | |
|---|---|---|---|
| *Receipts Brought Forward* | | | $13,282,172.66 |
| *Disbursements Brought Forward* | | $5,264,971.10 | |
| MEDICAL EDUCATION (Exhibit C) | | 836,328.10 | |
| MENTAL HYGIENE (Exhibit D) | | 93,509.95 | |
| RESEARCH IN PHYSICS AND CHEMISTRY (Exhibit E) | | 50,466.77 | |
| SCHOOL OF HYGIENE AND PUBLIC HEALTH (Exhibit F) | | 330,220.55 | |
| WAR WORK (Exhibit G) | | 20,663.97 | |
| MISCELLANEOUS (Exhibit H) | | 276,603.11 | |
| ADMINISTRATION (Exhibit H) | | 205,092.72 | |
| | | | 7,077,856.27 |
| Income on hand December 31, 1920. | | | $6,204,316.39 |
| Income on hand December 31, 1920, is accounted for as follows: | | | |
| Securities (Exhibit P) | | $4,963,894.68 | |
| Cash on deposit | | 61,316.33 | |
| Moneys loaned | | 1,450,000.00 | |
| Funds in hands of agents, to be accounted for, and sundry accounts receivable | | 1,552,629.09 | |
| | | $8,027,840.10 | |
| Less: | | | |
| Moneys borrowed | $1,800,000.00 | | |
| Accounts payable | 23,523.71 | | |
| | | 1,823,523.71 | |
| | | $6,204,316.39 | |

EXHIBIT B—*Continued*

## STATEMENTS OF RECEIPTS AND DISBURSEMENTS OF INCOME

### SPECIAL FUNDS

#### LAURA S. ROCKEFELLER FUNDS

| | | |
|---|---|---|
| Income collected during the year ending December 31, 1920 | | $3,000.00 |
| Amounts paid to the several societies designated by Mrs. Rockefeller | $3,000.00 | |

#### JOHN D. ROCKEFELLER FUND

| | | |
|---|---|---|
| Income collected during the year ending December 31, 1920 | | $1,850.00 |
| Amounts paid to the several societies designated by Mr. Rockefeller | $1,850.00 | |

#### ESTATE LAURA S. ROCKEFELLER FUND

| | |
|---|---|
| Balance of income December 31, 1919 | $49,763.70 |
| Balance of principal set aside for appropriation | 152,733.00 |
| Additional gift from the estate | 10,256.93 |
| TOTAL | $212,753.63 |
| Amount paid to Fifth Avenue Baptist Church on account of appropriation of $212,688.86 | 184,000.00 |
| Balance accounted for in cash on deposit | $28,753.63 |

#### HENRY STURGIS GREW MEMORIAL FUND

| | |
|---|---|
| Balance, December 31, 1919 | $1,885.70 |
| Income collected during the year ending December 31, 1920 | 1,098.63 |
| Accounted for in cash on deposit | $2,984.33 |

#### ARTHUR THEODORE LYMAN ENDOWMENT

| | |
|---|---|
| Balance, December 31, 1919 | $217.23 |
| Income collected during the year ending December 31, 1920 | 248.63 |
| Accounted for in cash on deposit | $465.86 |

# EXHIBIT C

## 1920 FOUNDATION APPROPRIATIONS,

UNPAID BALANCES OF APPROPRIATIONS MADE IN PREVIOUS YEARS, AND PAYMENTS THEREON MADE IN 1920

### MEDICAL EDUCATION

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| Austria, Hungary, Poland, Czechoslovakia, and Jugo-Slavia | | | |
| (R.F. 2495) To co-operate with the medical schools in the rehabilitation of their scientific equipment for teaching and research........ | ........ | $100,000.00 | $106.60 |
| Belgium | | | |
| (R.F.2471) Fondation Reine Elisabeth of Brussels—Francs 1,000,000........... | ........ | 85,000.00 | 80,971.66 |
| (R.F. 2498) Expenses of visit to the United States of delegates from the University of Brussels........ | ........ | 4,500.00 | 3,757.71 |
| Brazil | | | |
| (R.F. 2485) Oswaldo Cruz Institute, Rio de Janeiro. For extending its work in pathology......... | ........ | 3,000.00 | ........ |
| (R.F. 2487) Oswaldo Cruz Institute, Rio de Janeiro. For traveling expenses to Brazil of professor of pathology...... | ........ | 1,000.00 | ........ |
| (R.F. 2486) São Paulo University. Toward salary of professor of pathology — $4,000 per year for three years beginning 1920–21 (Instalment due 1920–21).. | ........ | 4,000.00 | ........ |

EXHIBIT C—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MEDICAL EDUCATION (*Cont'd*) | | | |
| Canada | | | |
| (R.F. 2470) Dalhousie University. Toward its program of medical school development | ........ | $500,000.00 | $500,000.00 |
| (R.F. 2489) University of Alberta.[1] For the development of work in clinical branches, 1920–21 | ........ | 25,000.00 | 6,250.00 |
| (R.F. 2488) Université de Montréal.[1] For the development of laboratories, 1920–21 | ........ | 25,000.00 | 12,500.00 |
| England | | | |
| (R.F. 2466, 2482, 2490) University College and University College Hospital Medical School, London. Expenses of visit to the United States of medical educators | ........ | 10,500.00 | 3,774.65 |
| (R.F. 2504) University of London. Toward building and equipment program of the University College Hospital Medical School—£50,000 | ........ | 180,000.00 | 174,625.00 |
| United States | | | |
| University of Chicago (R.F. 2367, 2430) For interest on pledge of $1,000,000 for the development of a Medical School | $16,626.77 | 50,000.00 | 40,463.23 |
| Fellowships | | | |
| Grants for medical study to doctors from the following countries | | | |
| (R.F. 2467) Belgium | ........ | 1,500.00 | ........ |
| (R.F. 2491) Canada | ........ | 1,650.00 | 546.30 |

EXHIBIT C—(*Continued*)

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MEDICAL EDUCATION (*Cont'd*) | | | |
| Fellowships (*cont'd*) | | | |
| (R.F. 2477) Czechoslovakia........ | ........ | $1,600.00 | $400.00 |
| (R.F. 2483, 2484, 2501, 2502) England............ | ........ | 6,000.00 | 2,178.04 |
| (R.F. 2492, 2500) Brazil.......... | ........ | 2,750.00 | 507.24 |
| Division of Medical Education | | | |
| (R.F. 2469) Administration—1920...... | ........ | 22,000.00 | 10,247.67 |
| TOTALS....... | $16,626.77 | $1,023,500.00 | $836,328.10 |
| Unexpended balances of appropriations allowed to lapse | | | |
| R.F. 2367 University of Chicago........ | 7,174.72 | ........ | ........ |
| R.F. 2471 Fondation Reine Elisabeth $4,028.34 | | | |
| R.F. 2504 University of London 5,375.00 | ........ | 9,403.34 | ........ |
| NET TOTALS.. | $9,452.05 | $1,014,096.66 | $836,328.10 |

## EXHIBIT D

## MENTAL HYGIENE

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| National Committee for Mental Hygiene | | | |
| (R.F. 2360, 2421, 2474) For the work of the Committee in aiding State Commissions on provision for the mentally defective | $11,684.49 | $35,000.00 | $27,363.17 |
| (R.F. 2361, 2422) For studies in the psychopathology of crime | 10,886.57 | 10,000.00 | 8,255.17 |
| (R.F. 2359, 2420, 2473) For carrying out its surveys of the care and treatment of mental diseases | 10,862.24 | 40,000.00 | 33,557.76 |
| (R.F. 2362, 2423) For the Committee's work in establishing uniform statistics on mental diseases | 1,213.22 | 4,000.00 | 4,333.85 |
| (R.F. 2400, 2424, 2455) For administration expenses | 2,500.00 | 20,000.00 | 20,000.00 |
| TOTALS | $37,146.52 | $109,000.00 | $93,509.95 |
| Unexpended balances of appropriations allowed to lapse | | | |
| R.F. 2359 ....... $10,144.26 | | | |
| R.F. 2360 ....... 10,668.89 | | | |
| R.F. 2361 ....... 9,774.65 | | | |
| R.F. 2362 ....... 215.45 | | | |
| R.F. 2400 ....... 2,500.00 | 33,303.25 | | |
| NET TOTALS | $3,843.27 | $109,000.00 | $93,509.95 |

Refund of amount disbursed in previous year
R.F. 2310 ........ $2,000.00

## EXHIBIT E

### RESEARCH IN PHYSICS AND CHEMISTRY

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| National Research Council | | | |
| (R.F. 2395, 2431) For the maintenance of a system of National Research Fellowships in physics and chemistry | $40,319.25 | $100,000.00 | $36,725.61 |
| (R.F. 2403, 2432) For expenses of the Division of Physical Sciences | 15,983.20 | 20,000.00 | 13,741.16 |
| TOTALS | $56,302.45 | $120,000.00 | $50,466.77 |
| Unexpended balances of appropriations allowed to lapse | | | |
| R.F. 2395 ....... $37,777.14 | | | |
| R.F. 2403 ....... 14,983.20 | 52,760.34 | | |
| NET TOTALS | $3,542.11 | $120,000.00 | $50,466.77 |

## EXHIBIT F

### SCHOOL OF HYGIENE AND PUBLIC HEALTH

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| Johns Hopkins University | | | |
| (R.F. 2170) For the establishment of a School of Hygiene and Public Health | $201,165.60 | ........ | $34,139.68 |
| (R.F. 2356, 2417, 2462) Operating expenses | 64,751.80 | $269,904.00 | 234,694.43 |
| (R.F. 2358, 2408, 2419, 2447) Building alterations | 18,967.91 | 21,250.00 | 11,461.03 |
| (R.F. 2409, 2448) Furniture | 12,740.00 | 15,000.00 | 17,299.89 |
| (R.F. 2283, 2410, 2418) Equipment | 21,086.06 | 15,000.00 | 30,938.67 |
| (R.F. 2449) Replacing records destroyed by fire | ........ | 3,000.00 | 1,686.85 |

EXHIBIT F—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| Scholarships or Stipends (R.F. 2390, 2456–60) For special work by medical men at the School of Hygiene and Public Health | $7,920.77 | $1,100.00 | .......... |
| TOTALS............ | $326,632.14 | $325,254.00 | $330,220.55 |
| Unexpended balances of appropriations allowed to lapse R.F. 2356....... $9,060.59 R.F. 2390....... 7,920.77 | 16,981.36 | | |
| R.F. 2456–60.... | ......... | 1,100.00 | .......... |
| NET TOTALS....... | $309,650.78 | $324,154.00 | $330,220.55 |

## EXHIBIT G

## WAR WORK

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| WELL-BEING OF SOLDIERS, SAILORS, AND PRISONERS-OF-WAR | | | |
| American Social Hygiene Association (R.F. 2330) For demonstration of social hygiene program in war camp community............. | $18,495.28 | ........ | ........ |
| MEDICAL WORK | | | |
| National Committee for Mental Hygiene (R.F. 2370) For war and reconstruction work—1919. | 1,083.87 | ........ | $1,083.87 |
| National Research Council (R.F. 2369) For special work of its Division of Medicine and Related Sciences in connection with the war emergency and demobilization period............ | 8,687.13 | ........ | 951.05 |

EXHIBIT G—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| Rockefeller Institute for Medical Research | | | |
| (R.F. 2386) For the operation of its War Demonstration Hospital 1919 | $14,666.49 | ........ | $14,666.49 |
| (R.F. 2388) For war work —1919 | 1,135.40 | ........ | 810.18 |
| (R.F. 2230) For additional equipment for teaching military and naval surgeons | 2,635.97 | ........ | ........ |
| (R.F. 2394) For the preparation of serums at Princeton Farm—1919 | 5,800.56 | ........ | 3,152.38 |
| HUMANITARIAN WORK | | | |
| American Red Cross | | | |
| (R.F. 2368) For the maintenance and care of Belgian children in Switzerland—1919 | 25,500.00 | ........ | ........ |
| War Relief Commission | | | |
| (R.F. 2216) Administration —1917 | 3,334.57 | ........ | ........ |
| TOTALS | $81,339.27 | ........ | $20,663.97 |
| Unexpended balance of appropriations allowed to lapse | | | |
| R.F. 2368 American Red Cross | 25,500.00 | ........ | ........ |
| NET TOTALS | $55,839.27 | ........ | $20,663.97 |

## EXHIBIT H

### MISCELLANEOUS

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| American Academy in Rome | | | |
| (R.F. 215) For general purposes, $10,000 per year for ten years beginning 1914. (Instalment due 1920).... | ........ | $10,000.00 | $10,000.00 |
| American Conference on Hospital Service | | | |
| (R.F. 2472) For the equipment and maintenance of a Library and Service Bureau | ........ | 15,000.00 | 3,000.00 |
| American Committee for relief of Viennese Medical Scientists | | | |
| (R.F. 2465) For purposes of food relief.............. | ........ | 10,000.00 | 10,000.00 |
| American Medical Association | | | |
| (R.F. 2452) To cover one-half of the net loss in publishing a Spanish edition of the Journal of the American Medical Association in 1919 | ........ | 9,792.59 | 9,792.59 |
| American University Union in Europe | | | |
| (R.F. 2464) For re-organization and maintenance expenses................. | ........ | 15,000.00 | 15,000.00 |
| Committee on Dispensary Development | | | |
| (R.F. 2481) For expenses during 1920............. | ........ | 10,000.00 | 4,500.00 |
| American Relief Administration | | | |
| (R.F. 2533) Toward its work in feeding European children.................. | ........ | 1,000,000.00 | ........ |
| Committee of Reference and Counsel of the Annual Foreign Mission Conference of North America | | | |
| (R.F. 228) For carrying out its program of co-operation and co-ordination in foreign missionary work of the principal American Mission Boards. Total pledge of $425,000 extending over a period of ten years beginning 1914. (Instalment due 1920).................. | ........ | 40,000.00 | 40,000.00 |

EXHIBIT H—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| Committee for Survey of Conditions and Possible Co-operation in the Care of Crippled Children in New York City | | | |
| (R.F. 2426) For a study of present facilities for care and re-education of such children, and of possible co-operation of the various agencies engaged in the work.................. | $7,018.50 | ........ | $5,486.85 |
| Committee for the Study of Public Health Nursing Education | | | |
| (R.F. 2407,2475) For a study in the proper training of public health nurses....... | 15,935.53 | $30,000.00 | 22,293.28 |
| Concilium Bibliographicum, Zurich, Switzerland | | | |
| (R.F. 2463) For expenses during 1920............. | ........ | 12,500.00 | 7,532.36 |
| Medical Centers of Europe | | | |
| (R.F. 2478,2494) For supplying the chief medical centers of Europe with important medical journals of America and England............ | ........ | 12,000.00 | 813.66 |
| New York Association for Improving the Condition of the Poor | | | |
| (R.F. 239) For the purpose of providing pensions for dependent widows with families. $20,000 per year for ten years beginning with 1914. (Balance of instalment due 1919)..... | 10,000.00 | ........ | 10,000.00 |
| (Instalment due 1920)...... | ........ | 20,000.00 | 10,000.00 |
| (R.F. 2453) To remove and re-erect as a summer camp for New York children the buildings of the War Demonstration Hospital ...... | ........ | 100,000.00 | 100,000.00 |
| Public Health Committee of the New York Academy of Medicine | | | |
| (R.F. 2399) For a study of the dispensaries of New York City.............. | 1,437.40 | ........ | 1,085.92 |

EXHIBIT H—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| Study of Medical and Public Health Conditions in Eastern and Southern Europe | | | |
| (R.F. 2479) For expenses during 1920...... | ........ | $3,000.00 | $2,353.33 |
| Hospital and Dispensary Studies | | | |
| (R.F. 2461) For expenses during 1920...... | ........ | 7,000.00 | 6,016.11 |
| National Information Bureau | | | |
| (R.F. 2451) For sustaining membership for the year 1919–20........ | ........ | 1,000.00 | 1,000.00 |
| National Organization for Public Health Nursing | | | |
| (R.F. 2425) Toward its budget for the year 1920............... | ........ | 5,000.00 | 5,000.00 |
| Rockefeller Institute for Medical Research | | | |
| (R.F. 2476) For studies in animal nutrition.... | ........ | 5,000.00 | ......... |
| Traveling Expenses | | | |
| (R.F. 2536) For expenses of representatives of the Foundation in connection with a conference in Belgium in regard to plans of the University of Brussels | ........ | 5,000.00 | 922.00 |
| War Demonstration Hospital | | | |
| (R.F. 2413) To remove the buildings of the hospital from the grounds of the Rockefeller Institute and re-erect them at such other place or places as may be advisable..... | $35,000.00 | ........ | ........ |
| *Totals Carried Forward*.. | $69,391.43 | $1,310,292.59 | $264,796.10 |

EXHIBIT H—*Continued*

| | | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|---|
| *Totals Brought Forward* | | $69,391.43 | $1,310,292.59 | $264,796.10 |
| ASSET ACCOUNTS | | | | |
| (R.F. 2439) Books for the library | | ........ | 700.00 | 466.66 |
| (R.F. 2438, 2480, 2468, 2496) Furniture and Fixtures | | ........ | 7,000.00 | 6,919.33 |
| (R.F. 2371, 2433) Grand Chenier Wild Life Refuge. Taxes and expenses | | 2,366.00 | 3,000.00 | 4,421.02 |
| | | $71,757.43 | $1,320,992.59 | $276,603.11 |
| Unexpended balances of appropriations allowed to lapse | | | | |
| (R.F. 2426) Committee for survey of conditions and possible co-operation in the care of crippled children in N. Y. City | $1,531.65 | | | |
| (R.F. 2413) War Demonstration Hospital | 35,000.00 | | | |
| | | 36,531.65 | ........ | ........ |
| (R.F. 2479) Study of medical and public health conditions in eastern and southern Europe | $646.67 | | | |
| (R.F. 2439) Books for the library | 233.34 | | | |
| (R.F. 2480) Furniture and fixtures | 80.67 | | | |
| | | ........ | 960.68 | ........ |
| NET TOTALS | | $35,225.78 | $1,320,031.91 | $276,603.11 |

EXHIBIT H—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| Administration | | | |
| (R.F. 2414, 2434, 2437, 2493, 2505 2535, 2540) Executive Offices..... | $619.33 | $187,763.84 | $185,588.11 |
| (R.F. 2374, 2435, 2436, 2534) Treasurer's Office ................ | 6,337.17 | 17,084.18 | 19,504.61 |
| TOTALS......... | $6,956.50 | $204,848.02 | $205,092.72 |
| Unexpended balances of appropriations allowed to lapse | | | |
| R.F. 2374..... $2,209.80 | | | |
| 2414.... 24.40 | 2,234.20 | ........ | ........ |
| R.F. 2435.... 553.04 | | | |
| 2493.... 2,770.66 | | | |
| 2534.... 1,153.90 | ........ | 4,477.60 | ........ |
| NET TOTALS..... | $4,722.30 | $200,370.42 | $205,092.72 |

## EXHIBIT I

## 1920 INTERNATIONAL HEALTH BOARD APPROPRIATIONS,[1]

### UNPAID BALANCES OF APPROPRIATIONS MADE IN PREVIOUS YEARS, AND PAYMENTS THEREON MADE IN 1920

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| HOOKWORM WORK | | | |
| Southern States | | | |
| Alabama | | | |
| 1919—I.H. 2482–7 | $12,484.01 | ........ | $2,003.87 |
| 1920—I.H. 2655–60, 2937 | ........ | $15,912.50 | 9,899.04 |
| Georgia | | | |
| 1919—I.H. 2490–4 | 12,700.00 | ........ | 4,604.21 |
| 1920—I.H. 2661–6 | ........ | 15,200.00 | ........ |
| Arkansas | | | |
| 1919—I.H. 2488–9 | 3,500.00 | ........ | ........ |
| Kansas | | | |
| 1920—I.H. 2896, 2906–7 | ........ | 6,145.83 | 916.66 |
| Kentucky | | | |
| 1919—I.H. 2327, 2495 | 4,535.03 | ........ | 842.52 |
| 1920—I.H. 2818–23, 2879 | ........ | 13,833.37 | 4,715.30 |
| Louisiana | | | |
| 1919—I.H. 2496–8 | 7,200.00 | ........ | 1,370.18 |
| Maryland | | | |
| 1919—I.H. 2499 | 2,400.00 | ........ | 2,264.25 |
| Mississippi | | | |
| 1919—I.H. 2563–8, 2583–6, 2623, 2759 | 8,582.39 | ........ | 8,280.60 |
| 1920—I.H. 2751–6, 2880–5, 2903 | ........ | 25,191.64 | 12,326.28 |
| North Carolina | | | |
| 1919—I.H. 2500–8, 2288–92, 2297–2300, 2317, 2339–48, 2407–9, 2403, 2420–22 | 5,729.42 | ........ | 2,373.58 |
| 1920—I.H. 2824–A–J, 21033, 2825–32, 2838, 2871–2, 2938, 2904 | ........ | 13,351.37 | 380.50 |

[1] The Foundation provides for the cost of work carried on by the International Health Board by making to the Board one or more appropriations to cover its work during the year. From these large grants the Board then makes its own appropriations for specific objects.

EXHIBIT I—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| HOOKWORM WORK (*Cont'd*) | | | |
| Southern States (*Cont'd*) | | | |
| South Carolina | | | |
| 1919—I.H. 2350–3, 2509, 2587–91, 2593, 2625–31, 2866–70 | $5,936.95 | ........ | $5,077.16 |
| 1920—I.H. 2667–73, 2905 | ........ | $19,602.11 | 12,156.79 |
| Tennessee | | | |
| 1919—I.H. 2514–18, 2596–2600 | 4,962.11 | ........ | 2,951.18 |
| 1920—I.H. 2674–8, 2944 | ........ | 15,575.00 | 9,837.41 |
| Texas | | | |
| 1919—I.H. 2519–23, 2632–37 | 8,536.46 | ........ | 3,054.51 |
| 1920—I.H. 2679–84 | ........ | 15,700.00 | 11,037.21 |
| Virginia | | | |
| 1919—I.H. 2569–72, 2594, 2612, 2624, 2716–7 | 13,444.44 | ........ | 10,012.42 |
| 1920—I.H. 2685–92, 2768, 2897, 21052–5 | ........ | 24,980.79 | 8,492.76 |
| West Virginia | | | |
| 1919—I.H. 2750 | 175.00 | ........ | 175.00 |
| 1920—I.H. 2769, 2898–21017 | ........ | 2,833.33 | 1,727.28 |
| Infection Surveys—I.H. 2895 | ........ | 500.00 | 107.40 |
| Central America | | | |
| Costa Rica | | | |
| 1919—I.H.2524 | 7,554.97 | ........ | 821.47 |
| 1920—I.H. 2693, 2718 | ........ | 19,196.00 | 9,881.99 |
| Guatemala | | | |
| 1919—I.H. 2525 | 7,029.72 | ........ | 2,154.53 |
| 1920—I.H. 2694 | ........ | 17,200.00 | 9,703.23 |
| Nicaragua | | | |
| 1919—I.H. 2526 | 9,539.66 | ........ | 7,584.30 |
| 1920—I.H. 2725 | ........ | 13,850.00 | 7,281.11 |
| Panama | | | |
| 1919—I.H. 2527, 2601 | 8,086.51 | ........ | 5,978.15 |
| 1920—I.H. 2695 | ........ | 16,860.00 | 11,093.94 |
| Salvador | | | |
| 1919—I.H. 2528 | 4,044.27 | ........ | Cr. 1,107.96 |
| 1920—I.H. 2696 | ........ | 12,450.00 | 5,564.14 |

EXHIBIT I—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| HOOKWORM WORK (*Cont'd*) | | | |
| South America | | | |
| Brazil | | | |
| 1919—I.H. 2480, 2550–8, 2576–9, 2573, 2602, 2622, 2639, 2715 ....... | $148,888.27 | ........ | $58,643.84 |
| 1920—I.H. 2780–90, 2736, 2836, 2939–40, 2945, 2643–44, 2646, 2649, 21013, 21030 ........... | ........ | $221,252.50 | 117,384.26 |
| British Guiana | | | |
| 1919—I.H. 2519 .... | 11,622.91 | ........ | 3,099.80 |
| 1920—I.H. 2697 .... | ........ | 9,520.00 | 22.32 |
| Colombia | | | |
| 1919—I.H. 2603 .... | 5,174.61 | ........ | Cr. .95 |
| 1920—I.H. 2724, 2824 | ........ | 23,000.00 | 6,969.46 |
| Dutch Guiana | | | |
| 1919—I.H. 2582 .... | 88.00 | ........ | 70.55 |
| 1920—I.H. 2698 .... | ........ | 744.00 | 376.00 |
| Ecuador | | | |
| 1920—I.H. 2727 .... | ........ | 6,000.00 | ........ |
| West Indies | | | |
| Grenada | | | |
| 1920—I.H. 2699 .... | ........ | 7,791.00 | ........ |
| Jamaica | | | |
| 1919—I.H. 2530 .... | 8,853.37 | ........ | 1,465.34 |
| 1920—I.H. 2700 .... | ........ | 11,970.00 | 5,922.97 |
| Porto Rico | | | |
| 1920—I.H. 2770, 2805 | ........ | 6,000.00 | 3,356.30 |
| St. Lucia | | | |
| 1919—I.H. 2531 .... | 2,528.06 | ........ | 1,892.88 |
| 1920—I.H. 2701 .... | ........ | 7,583.00 | 5,515.35 |
| Santo Domingo | | | |
| 1920—I.H. 2806 .... | ........ | 1,000.00 | 388.09 |
| Trinidad | | | |
| 1919—I.H. 2533 .... | 5,075.42 | ........ | 3,098.19 |
| 1920—I.H. 2702 .... | ........ | 9,540.00 | 3,802.74 |
| The East | | | |
| Australia | | | |
| 1919—I.H. 2642, 2535 | 10,366.79 | ........ | 4,439.88 |
| 1920—I.H. 2729–34.. | ........ | 37,743.00 | 12,552.23 |
| Borneo | | | |
| 1920—I.H. 2941 .... | ........ | 5,400.00 | 2,944.45 |

EXHIBIT I—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| HOOKWORM WORK (*Cont'd*) | | | |
| The East (*Cont'd*) | | | |
| Ceylon | | | |
| 1919—I.H. 2548, 2534 | $12,481.88 | ........ | $6,723.98 |
| 1920—I.H. 2771–6, 2910 | ........ | $21,500.00 | 3,806.15 |
| Egypt | | | |
| 1915—I.H. 237 | 4,641.88 | ........ | ........ |
| India | | | |
| 1920—I.H. 2942 | ........ | 500.00 | 393.48 |
| Mauritius | | | |
| 1920—I.H. 2943 | ........ | 200.00 | 200.00 |
| Seychelles Islands | | | |
| 1919—I.H. 2536 | 2,734.66 | ........ | 748.31 |
| 1920—I.H. 2703 | ........ | 7,000.00 | 395.50 |
| Siam | | | |
| 1919—I.H. 2537 | 10,084.10 | ........ | 85.33 |
| 1920—I.H. 2779 | ........ | 5,000.00 | 4,348.98 |
| China | | | |
| 1919—I.H. 2549 | 9,872.81 | ........ | ........ |
| Miscellaneous | | | |
| Conference of health officers of the Southern States I.H. 21047 | ........ | 4,000.00 | ........ |
| Investigation of sewage disposal at rural homes—I.H. 2309 | 5,711.99 | ........ | ........ |
| Motor boat for Dutch Guiana—I.H. 2231 | 89.64 | ........ | ........ |
| Portable house and office at salvador—I.H. 2449, 2614, 2839 | 278.46 | 150.00 | ........ |
| Analysis of hookworm records of U. S. Army —I.H. 2608 | 4,456.05 | ........ | ........ |
| MALARIA WORK | | | |
| Southern States | | | |
| Alabama | | | |
| 1920—I.H. 2840–5 | ........ | 5,114.50 | ........ |
| Arkansas | | | |
| 1919—I.H. 2547 | 1,646.32 | ........ | 1,109.51 |
| 1920—I.H. 2888 | ........ | 405.00 | ........ |
| Georgia | | | |
| 1920—I.H. 2889–91 | ........ | 450.00 | ........ |

EXHIBIT I—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MALARIA WORK (*Cont'd*) | | | |
| Southern States (*Cont'd*) | | | |
| Louisiana | | | |
| 1920—I.H. 2794–7, 2837, 2846–7, 2849, 2886–7, 21031–2... | ........ | $22,471.47 | $9,495.43 |
| Mississippi | | | |
| 1919—I.H. 2538, 2545, 2620....... | $18,087.04 | ........ | 6,175.63 |
| 1920—I.H. 2757, 2791–2, 2810, 2873–7.......... | ........ | 21,168.50 | 14,051.63 |
| North Carolina | | | |
| 1920—I.H. 2798–2801 | ........ | 9,013.50 | ........ |
| South Carolina | | | |
| 1920—I.H. 2760–3, 2936, 21050...... | ........ | 11,500.00 | ........ |
| Tennessee | | | |
| 1920—I.H. 2892–3 .. | ........ | 2,717.00 | ........ |
| Texas | | | |
| 1920—I.H. 2850–5 .. | ........ | 3,552.08 | ........ |
| Virginia | | | |
| 1920—I.H. 2811–15 . | ........ | 4,350.00 | ........ |
| Co-operative demonstration malaria control —Home Office Fund I.H. 2793, 2856..... | ........ | 1,100.00 | 747.63 |
| Conference of Malaria workers I.H. 2948... | ........ | 3,000.00 | 1,664.85 |
| South America | | | |
| Ecuador | | | |
| 1920—I.H. 2726.... | ........ | 6,000.00 | 3,251.52 |
| West Indies | | | |
| Porto Rico | | | |
| 1920—I.H. 2807.... | ........ | 1,500.00 | 241.68 |
| YELLOW FEVER WORK | | | |
| Ecuador | | | |
| 1919—I.H. 2539, 2619, 2452...... | 74,729.94 | ........ | 3,070.19 |
| 1920—I.H. 2728... | ........ | 50,000.00 | 18,729.90 |
| Salvador— | | | |
| 1919—I.H. 2575... | 1,253.64 | ........ | 644.35 |
| 1920—I.H. 2803... | ........ | 2,500.00 | 2,500.00 |
| Epidemic work | | | |
| 1920—I.H. 2902, 2909.......... | ........ | 40,000.00 | 13,527.48 |

EXHIBIT I—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| YELLOW FEVER WORK (*Cont'd*) | | | |
| Associates of Director | | | |
| Salaries, traveling expenses, equipment and supplies | | | |
| 1919—I.H. 2574, 2618.......... | $17,429.95 | ........ | $4,529.82 |
| 1920—I.H. 2804, 2908, 21016..... | ........ | $95,000.00 | 60,669.74 |
| TUBERCULOSIS WORK IN FRANCE | | | |
| Central Administration | | | |
| 1919—I.H. 2541... | 52,643.80 | ........ | 7,807.19 |
| 1920—I.H. 2706... | ........ | 141,543.00 | 78,674.44 |
| Departmental Organization | | | |
| 1920—I.H. 2710... | ........ | 149,663.00 | 45,749.19 |
| Educational Division | | | |
| 1919—I.H. 2543... | 68,545.20 | ........ | 24,598.54 |
| 1920—I.H. 2709... | ........ | 182,402.00 | 107,966.32 |
| Medical Division | | | |
| 1919—I.H. 2542... | 198,108.00 | ........ | 129,436.32 |
| 1920—I.H. 2307... | ........ | 169,800.00 | 63,794.77 |
| Public Health Visiting | | | |
| 1920—I.H. 2708... | ........ | 219,934.00 | 64,432.73 |
| MEDICAL EDUCATION | | | |
| Brazil | | | |
| Sao Pãulo Department of Hygiene I.H. 2467, 2595, 2704.......... | 4,925.84 | 9,500.00 | 6,724.59 |
| Fellowships | | | |
| Public Health I.H. 2311, 2441–2, 2456, 2461—3, 2610, 2621, 2638, 2712, 2719–23, 2758, 2765, 2778, 2808–9, 2833–4, 2816, 2857–65, 2878, 2894, 2911, 2931, 2904...... | 14,918.11 | 91,456.56 | 37,564.00 |

EXHIBIT I—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| ADMINISTRATIVE FIELD STAFF | | | |
| Salaries—I.H. 2469, 2764, 2899, 2644... | $2,191.29 | $334,674.67 | $242,008.22 |
| Traveling expenses—I.H. 2471, 2901, 2646............ | 7,553.35 | 84,270.72 | 78,739.14 |
| Commutation—I.H. 2470, 2900, 2645... | 2,108.17 | 60,564.72 | 23,988.11 |
| Medical examination of applicants I.H. 2649............ | ........ | 700.00 | 125.00 |
| Drugs for conserving health I.H. 2648... | ........ | 1,000.00 | 32.29 |
| Traveling expenses of families I.H. 21049, 2472, 2646, 2647... | 3,084.63 | 12,000.00 | 13,697.10 |
| Automobiles for directors in training —I.H. 2650...... | ........ | 3,000.00 | ........ |
| Study leave—I.H. 2468, 2713–4...... | ........ | 1,000.00 | 439.94 |
| Tuition—Staff members in training I.H 2802............ | ........ | 500.00 | 408.38 |
| MISCELLANEOUS | | | |
| Czechoslovakia Public health work —I.H. 2935..... | ........ | 30,000.00 | 3,242.36 |
| Express, freight, and exchange—I.H. 2652............ | ........ | 25,000.00 | Cr. 974.64 |
| Motion picture film on hookworm disease—I.H. 2835, 2947............ | ........ | 4,800.00 | 2,817.73 |
| Investigation of scientific preparation and preservation of powdered milk—I.H. 2946......... | ........ | 500.00 | 500.00 |
| Field equipment and supplies I.H. 2651. | ........ | 10,000.00 | 5,996.96 |
| Massachusetts public health survey I.H. 2767............ | 1,473.91 | ........ | 1,466.42 |
| Pamphlets and charts —I.H. 2653....... | ........ | 10,000.00 | 5,873.33 |

EXHIBIT I—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MISCELLANEOUS (*Cont'd*) | | | |
| Study of teaching of hygiene—I.H.21011 | ........ | $500.00 | $34.69 |
| Paris conference on an international nomenclature of the causes of death—I.H. 21015........ | ........ | 615.30 | 615.30 |
| Survey and exhibits Administration—I.H. 2705, 21029... | ........ | 23,950.00 | 23,528.78 |
| Training of British bacteriologist in the Noguchi yellow fever technique—I.H 2817............ | ........ | 2,000.00 | ........ |
| Philippine Hospital Ship—I.H. 2481... | $12,500.00 | ........ | ........ |
| ADMINISTRATION | | | |
| Home Office—I.H. 2711............ | ........ | 96,387.00 | 91,472.20 |
| TOTALS...... | $850,589.03 | $2,579,878.46 | $1,623,375.20 |
| Unexpended balances of appropriations allowed to lapse...... | 490,152.80 | 159,779.05 | ........ |
| NET TOTALS.. | $360,436.23 | $2,420,099.41 | $1,623,375.20 |

NOTE—The Foundation appropriated to the International Health Board for its work during the year 1920 the sum of $2,500,000.

## EXHIBIT J

### 1920 CHINA MEDICAL BOARD APPROPRIATIONS,[1]

UNPAID BALANCES OF APPROPRIATIONS MADE IN PREVIOUS YEARS, AND PAYMENTS THEREON DURING THE YEAR 1920

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MISSIONARY SOCIETIES—HOSPITALS | | | |
| American Baptist Foreign Mission Society | | | |
| (C.M. 276) Ningpo hospital—Salaries of doctor and nurse, $2,250 per year for five years. (Instalment for first year). | ....... | $2,250.00 | ........ |
| (C.M. 277) Shaohsing hospital—Support of foreign nurse, Chinese manager, and foreign doctor, $2,475 per year for five years. (Instalment for first year)..... | ........ | 2,475.00 | ........ |
| (C.M. 278) Shaohsing hospital — Equipment and residences for physician, nurse, and Chinese staff ............ | $5,625.00 | ........ | ........ |
| American Board of Commissioners for Foreign Missions | | | |
| (C.M. 211, 294) Tehchow hospital—Salary of two doctors, $3,236 per year for five years beginning 1915. (Balance due on instalments) .......... | 11,964.00 | ........ | $167.40 |
| (C.M. 297, 2229) Tehchow hospital—Employes' salaries, $4,152 per year for five years beginning 1916. (Balance due on previous instalments) .......... | 6,596.28 | ........ | 3,114.03 |
| (Instalment for 1920). | ........ | 4,152.00 | ........ |

[1] The Foundation provides for the cost of work carried on by the China Medical Board by making to the Board one or more appropriations to cover its work for the year. From these large grants the Board then makes its own appropriations for specific objects.

EXHIBIT J—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MISSIONARY SOCIETIES—HOSPITALS (*Cont'd*) | | | |
| American Board of Commissioners for Foreign Missions (*Cont'd*) | | | |
| (C.M.2360) Tehchow hospital—Salary of business manager, $3,525.88 extended over a period of four years beginning 1918. (Balance due on previous instalments)... | $475.13 | ........ | $475.13 |
| (Instalment due 1920).. | ........ | $950.25 | 237.55 |
| Board of Foreign Missions of the Methodist Episcopal Church | | | |
| (C.M. 223, 2102) Peking hospital—Salary of doctor, $2,400 per year for five years beginning 1916. (Balance due on previous instalments).. | 6,400.00 | ........ | ........ |
| (Instalment due 1920). | ........ | 2,400.00 | ........ |
| (C.M. 2266) Peking hospital—Support of dentist, medical practitioner, and nurse, $22,500 extending over a period of five years beginning 1918. (Balance due on previous instalments).. | 11,250.00 | ........ | ........ |
| (Instalment due 1920). | ........ | 4,500.00 | ........ |
| (C.M. 283, 2176) Wuhu hospital—Salary and allowance of doctor, $900 per year for five years beginning with 1916. (Balance due on previous instalments).. | 1,200.00 | ........ | ........ |
| (Instalment due 1920).. | ........ | 900.00 | ........ |
| (C.M. 2384) Wuhu hospital—Building of hospital and residences.... | 40,000.00 | ........ | ........ |

EXHIBIT J—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MISSIONARY SOCIETIES—HOSPITALS (*Cont'd*) | | | |
| American Board of Commissioners for Foreign Missions (*Cont'd*) | | | |
| (C.M. 2385) Wuhu hospital—Salaries of additional staff and maintenance expenses, $7,250 per year for five years beginning 1920. (Instalment due 1920) .... | ........ | $7,250.00 | ........ |
| (C.M. 2474) Wuhu hospital — Buildings and equipment ........... | ........ | 30,000.00 | ........ |
| Board of Missions of the Methodist Episcopal Church, South | | | |
| (C.M. 236, 2105) Soochow hospital—Salary of nurse, $600 per year for five years beginning 1916. (Balance due on previous instalments).. | $1,200.00 | ........ | ........ |
| (Instalment due 1920). | ........ | 600.00 | ........ |
| (C.M. 2417) Soochow hospital—Buildings and equipment. Mex. $50,-000 .............. | ........ | 60,000.00 | $17,500.00 |
| (C.M. 2418) Soochow hospital—Maintenance of additional foreign staff. Mex. $8,000 per year for five years beginning 1920. (Instalment due 1920)........ | ........ | 9,500.00 | ........ |
| Board of Missions of the Methodist Espiscopal Church, South—American Baptist Foreign Mission Society, Jointly | | | |
| (C.M. 2151) New union hospital, Huchow—Building and equipment................ | 20,000.00 | ........ | ........ |

EXHIBIT J—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MISSIONARY SOCIETIES—HOSPITALS (*Cont'd*) | | | |
| Board of Missions of the Methodist Episcopal Church, South—American Baptist Foreign Missionary Society, Jointly (*Cont'd*) | | | |
| (C.M. 2152) New union hospital, Huchow—Support of foreign physician, $5,025 extending over a period of five years. (Instalment for first year) | ........ | $1,650.00 | ........ |
| (C.M. 2153) New union hospital, Huchow—Support of foreign nurse, $3,000 extending over a period of five years. (Instalment for first year) | ........ | 825.00 | ........ |
| (C.M. 2154) New union hospital, Huchow—Support of Chinese physician, $2,250 extending over a period of five years. (Instalment for first year) | ........ | 450.00 | ........ |
| Board of Foreign Missions of the Presbyterian Church in the U. S. A. | | | |
| (C.M. 2144) Changteh hospital—Current expenses, $2,625 per year for five years beginning 1916. (Balance due on previous instalment) | $5,568.75 | ........ | ........ |
| (Instalment due 1920) | ........ | 2,625.00 | ........ |
| (C.M. 2318) Changteh hospital—Current expenses, $2,250 per year for five years beginning 1918. (Instalment due 1920) | ........ | 2,250.00 | ........ |

EXHIBIT J—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MISSIONARY SOCIETIES—HOSPITALS (*Cont'd*) | | | |
| Board of Foreign Missions of the Presbyterian Church in the U. S. A. (*Cont'd*) | | | |
| (C.M. 284) Chefoo hospital—Salary and allowance of doctor and nurse, $2,625 per year for five years beginning 1917. (Balance due on previous instalments) . . | $5,808.80 | ........ | ........ |
| (Instalment due 1920) | ........ | $2,625.00 | ........ |
| (C.M. 2243) Chefoo hospital—Operating expenses, $2,250 per year for five years beginning 1918. (Instalment due 1920) . . . . . . . . . . . . . . . . | ........ | 2,250.00 | $2,250.00 |
| (C.M. 285) Hwaiyuen hospital—Salary and allowance of physician and nurse and operating expenses, $3,375 per year for five years beginning 1919. (Balance due on previous instalments) . . . . . . . . . . | 2,625.00 | ........ | ........ |
| (Instalment due 1920) . | ........ | 3,375.00 | ........ |
| (C.M. 286) Hwaiyuen hospital—Residence of doctor and equipment | 5,250.00 | ........ | 3,000.00 |
| (C.M. 214, 295) Paotingfu—Salaries of doctor and two nurses. Shuntehfu—Salaries of doctor and two nurses, $9,200 per year for five years beginning 1916. (Balance due on previous instalments) . . . . . . . . . . | 11,275.00 | ........ | ........ |
| (Instalment due 1920) . | ........ | 9,200.00 | 2,400.00 |
| (C.M. 2306) Paotingfu hospital—Support of business manager, $900 for four years beginning 1918. (Instalment due 1920) . . . . . . . . . . . . . . . . | ........ | 900.00 | ........ |

EXHIBIT J—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MISSIONARY SOCIETIES—HOSPITALS (*Cont'd*) | | | |
| Board of Foreign Missions of the Presbyterian Church in the U. S. A. (*Cont'd*) | | | |
| (C.M. 2142) Shuntehfu hospital—Maintenance, $750 per year for five years beginning 1916. (Balance due on previous instalments)...... | $437.50 | ........ | ........ |
| (Instalment due 1920). | ........ | $750.00 | ........ |
| Board of Foreign Missions of the Reformed Church in America | | | |
| (C.M. 2282) Hope and Wilhelmina hospital—Purchase of pump, well, and engine, and electric light plant........... | 2,025.00 | ........ | ........ |
| (C.M. 2283) Hope and Wilhelmina hospital—Support of physician, $1,881 per year for five years. (Instalment for first year)............ | ........ | 1,881.00 | ........ |
| Canton Christian College | | | |
| (C.M. 2139) Canton hospital—Salary of business manager and current expenses, $4,500 per year for five years beginning 1917. (Instalment due 1920)................ | ........ | 4,500.00 | $4,500.00 |
| (C.M. 2446) Canton hospital—General purposes | ........ | 6,000.00 | 6,000.00 |
| Church of Scotland Foreign Mission Committee | | | |
| (C.M. 288) Ichang hospital—Equipment..... | 375.00 | ........ | 375.00 |
| (C.M. 289) Ichang hospital—Support of third foreign doctor and nurse, $2,250 per year for five years beginning 1920. (Instalment due 1920). | ........ | 2,250.00 | 750.00 |

EXHIBIT J—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MISSIONARY SOCIETIES—HOSPITALS (*Cont'd*) | | | |
| Domestic and Foreign Mission Society of the Protestant Episcopal Church in the U. S. A. | | | |
| (C.M. 2308) St. James hospital, Anking—Operating expenses, $4,200 per year for five years beginning 1919. (Balance due on previous instalment)........... | $2,025.00 | ........ | $2,025.00 |
| (Instalment due 1920). | ........ | $4,200.00 | 375.00 |
| (C.M. 2361) St. James hospital, Anking—Residence of physician..... | 5,500.00 | ........ | ........ |
| Executive Committee of Foreign Missions of the Presbyterian Church in the U. S., South | | | |
| (C.M. 221, 2101) Soochow—Salary, outfit, and travel to field, of foreign nurse; Kashing—Salary, outfit, and travel to field, of foreign nurse. Salaries, $3,600 per year for five years beginning 1915. (Balance due on previous instalments).. | 13,625.00 | ....... | ........ |
| Foreign Christian Missionary Society | | | |
| (C.M. 2327) Luchowfu hospital—Buildings and fixed equipment....... | 5,500.00 | ........ | 5,000.00 |
| (C.M. 2328) Luchowfu hospital—Movable equipment................ | 4,800.00 | ........ | ........ |
| (C.M. 2329) Luchowfu hospital—Maintenance, $4,100 per year for five years. (Instalment for first year)........... | ........ | 4,100.00 | ........ |

EXHIBIT J—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MISSIONARY SOCIETIES—HOSPITALS (*Cont'd*) | | | |
| Foreign Christian Missionary Society (*Cont'd*) | | | |
| (C.M. 2330) Luchowfu hospital—Salary of second foreign nurse, $1,400 per year for five years. (Instalment for first year) | ........ | $1,400.00 | ........ |
| (C.M. 2331) Luchowfu hospital—Salary of business manager, $1,400 per year for five years. (Instalment for first year) | ........ | 1,400.00 | ........ |
| (C.M. 215, 2100) Luchowfu hospital — Salary and allowance of doctor and nurse; Nantungchow hospital — Salary and allowance of nurse, $4,200 per year for five years beginning 1918. (Balance due on previous instalment) | $5,205.00 | ........ | ........ |
| (Instalment due 1920) | ........ | 4,200.00 | ........ |
| (C.M. 2218) Nantungchow hospital—Support of second physician, $8,400 extending over a period of five years. (Instalment for first year) | ........ | 1,800.00 | ........ |
| Foreign Mission Board of the Southern Baptist Convention | | | |
| (C.M. 228, 2106) Chengchow hospital—Salary of doctor, $1,200 per year for five years beginning 1916. (Balance due on previous instalment) | 2,050.00 | ........ | ........ |
| (Instalment due 1920) | ........ | 1,200.00 | ........ |

EXHIBIT J—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MISSIONARY SOCIETIES—HOSPITALS (*Cont'd*) | | | |
| Foreign Mission Board of the Southern Baptist Convention (*Cont'd*) | | | |
| (C.M. 281) Hwanghien hospital—Salary of physician, $900 per year for five years. (Instalment for first year) | ........ | $900.00 | ........ |
| (C.M. 282) Hwanghien hospital—Outfit and travel of physician... | $750.00 | ........ | ........ |
| (C.M. 225, 2103) Hwanghien hospital—Salary of nurse, $600 per year for five years beginning 1916. (Balance due on previous instalments) | 900.00 | ........ | ........ |
| (Instalment due 1920) | ........ | 600.00 | ........ |
| (C.M. 280) Laichowfu hospital—Equipment and outgoing expenses of physician and wife. | 750.00 | ........ | ........ |
| (C.M. 279) Laichowfu hospital—Salary of physician and wife and nurse, $1,650 per year for five years. (Instalment for first year) | ........ | 1,650.00 | ........ |
| (C.M. 232, 2104) Yangchow Hospital—Salary of nurse, $600 per year for five years beginning 1916. (Balance due on previous instalments) | 1,025.00 | ........ | ........ |
| (Instalment due 1920) | ........ | 600.00 | ........ |
| London Missionary Society | | | |
| (C.M. 2167) Siaochang hospital—Support of nurse, $600 per year for five years. (Instalment for first year) | ........ | 600.00 | ........ |

EXHIBIT J—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MISSIONARY SOCIETIES—HOSPITALS (*Cont'd*) | | | |
| London Missionary Society (*Cont'd*) | | | |
| (C.M.2326) Tsangchow hospital—Support of nurse, $750 per year for five years beginning 1918. (Instalment due 1919)..... | $750.00 | ........ | ........ |
| (Instalment due 1920) | ........ | $750.00 | ........ |
| Medical Mission Auxiliary of London | | | |
| (C.M. 2201) Tai Yuan Fu hospital — Improvements and supplies.............. | 3,150.00 | ........ | $1,447.78 |
| United Free Church of Scotland | | | |
| (C.M. 2232) Mukden hospital—Support of nurse, $750 per year for five years beginning 1918. (Instalment due 1919)..... | 750.00 | ........ | ........ |
| (Instalment due 1920) | ........ | 750.00 | ........ |
| University of Nanking | | | |
| (C.M. 2137) Nanking hospital—Current expenses, $9,250 per year for five years beginning 1917. (Instalment due 1919).. | 9,250.00 | ........ | ........ |
| (Instalment due 1920) | ........ | 9,250.00 | ........ |
| Women's Foreign Missionary Society of the Methodist Episcopal Church | | | |
| (C.M. 2359) Kiukiang hospital—Salary of nurse, $500 per year for five years beginning 1919. (Balance due on previous instalment).......... | 342.50 | ........ | 342.50 |
| (Instalment due 1920) | ........ | 500.00 | ........ |

EXHIBIT J—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MISSIONARY SOCIETIES—HOSPITALS (*Cont'd*) | | | |
| Loss in Exchange (C.M. 2251, 2252, 2349, 2419) To cover loss in exchange on payments to missionary societies for their hospitals........... | $195,820.76 | $145,000.00 | $7,980.88 |
| Emergency Fund (C.M.2211,2383,2456) For aid of medical work in China, at the discretion of the resident director....... | 1,131.33 | 2,000.00 | 1,281.20 |
| HOSPITALS UNDER CHINESE MANAGEMENT | | | |
| Central Hospital, Peking (C.M. 2463) Equipment for laboratories | ........ | 3,000.00 | 3,000.00 |
| (C.M. 2464) Salaries of Chinese doctor and nurse, $5,000 per year for three years beginning 1920. (Instalment due 1920)... | ........ | 2,500.00 | ........ |
| MISSIONARY SOCIETIES—HOSPITALS AND PRE-MEDICAL EDUCATION | | | |
| Yale Foreign Missionary Society | | | |
| (C.M. 2454) Hunan-Yale Medical School, Changsha—Salaries and expenses of staff of hospital, pre-medical school, and nurses' training school, Mex. $41,605 per year for five years beginning July 1, 1920. (Instalment due 1920)..... | ........ | 25,000.00 | ........ |

EXHIBIT J—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MISSIONARY SOCIETIES—HOSPITALS AND PRE-MEDICAL EDUCATION (*Cont'd*) | | | |
| Yale Foreign Missionary Society (*Cont'd*) | | | |
| (C.M. 2455) Hunan-Yale Medical School, Changsha—Salaries and expenses of staff of hospital, pre-medical school, and nurses' training school, $6,645 per year for five years beginning July 1, 1920 (Instalment due 1920) | ........ | $6,645.00 | ........ |
| PRE-MEDICAL EDUCATION | | | |
| Canton Christian College | | | |
| (C.M. 2443) Equipment | ........ | 10,000.00 | ........ |
| (C.M. 2444) Residences. Mex. $25,500 | ........ | 30,000.00 | $20,718.75 |
| (C.M. 2445) Salaries of two professors and one instructor. Mex. $10,200 per year for five years beginning 1920. (Instalment due 1920) | ........ | 12,000.00 | 7,803.00 |
| Fukien Christian University | | | |
| (C.M. 2273) Building and equipment for science department | $50,000.00 | ........ | 27,084.00 |
| (C.M. 2274) Salaries of six instructors, $10,000 per year for five years beginning 1919. (Instalment due 1920) | ........ | 10,000.00 | 10,000.00 |
| (C.M. 2275) Salaries of Chinese instructors, $2,700 per year for five years beginning 1919. (Instalment due 1920) | ........ | 2,700.00 | 2,700.00 |

EXHIBIT J—*Conitnued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| PRE-MEDICAL EDUCATION | | | |
| Fukien Christian University (*Cont'd*) | | | |
| (C.M. 2276) Maintenance of science department, $10,000 per year for five years beginning 1919. (Instalment due 1920) . . | ........ | $10,000.00 | $10,000.00 |
| Ginling College | | | |
| (C.M. 2402) Salary of teacher of physics, $2,400 per year for five years beginning 1920. (Instalment due 1920) .......... | ........ | 2,400.00 | ........ |
| (C.M. 2403) Purchase of scientific equipment .............. | $5,000.00 | ....... | ........ |
| St. John's University, Shanghai | | | |
| (C.M. 2415) Maintenance expenses, $18,800 extending over a period of four years beginning 1920. (Instalment due 1920) . . | ........ | 3,000.00 | 3,000.00 |
| (C.M. 2416) Construction and equipment of laboratory building | ........ | 60,000.00 | 60,000.00 |
| (C.M. 2457) Salary of instructor for year 1920–21 ........... | ........ | 1,500.00 | 1,500.00 |
| MEDICAL EDUCATION | | | |
| Medical Schools—Unaffiliated | | | |
| Shantung Christian University | | | |
| (C.M. 252) Expense of educating students sent to Tsinanfu by the China Medical Board during a period of five years ............ | 10,000.00 | ........ | 10,000.00 |

EXHIBIT J—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MEDICAL EDUCATION | | | |
| Medical Schools—Unaffiliated (*Cont'd*) | | | |
| Shantung Christian University (*Cont'd*) | | | |
| (C.M. 2217, 2358) To cover loss in exchange in connection with appropriations C.M.251 and C.M. 252........ | $48,236.55 | ........ | $30,000.00 |
| Yale Foreign Missionary Society | | | |
| (C.M. 27) Support of Hunan-Yale Medical School, Changsha, $16,200 per year for five years beginning 1915. (Balance due on previous instalment).. | 8,100.00 | ........ | 8,100.00 |
| (C.M.2230) Support of Hunan-Yale Medical School, Changsha, $9,000 extending over a period of three years beginning 1917. (Instalment due 1919).... | 2,000.00 | ........ | 2,000.00 |
| (C.M. 2231) Support of third instructor in premedical department of Hunan-Yale Medical School, $6,200 extending over a period of three years beginning 1917. (Instalment due 1919). | 1,500.00 | ........ | 1,500.00 |
| (C.M. 2414) To cover loss in exchange in connection with appropriations C.M. 27 and 2230...... | ........ | 6,937.50 | 6,937.50 |

EXHIBIT J—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MEDICAL EDUCATION (*Cont'd*) | | | |
| Medical Schools—Affiliated | | | |
| Peking Union Medical College Asset Accounts | | | |
| Purchase of additional property (C.M. 213, 248, 249, 2170, 2213, 2336, 2381). | $86,353.49 | ........ | $9,938.62 |
| Buildings and fixed equipment (C.M. 2401, 2406, 2491, 2492). | 327,356.43 | $2,434,234.96 | 2,405, 959.59 |
| Alterations to original buildings (C.M. 2407)...... | ........ | 40,846.08 | 17,411.38 |
| Street improvements (C.M. 2408)...... | ........ | 9,000.00 | ........ |
| Movable equipment (C.M. 2339, 2355, 2409)...... | 282,257.38 | 229,000.00 | 167,900.42 |
| Accessories (C.M. 2340, 2356, 2410). | 149,068.21 | 61,000.00 | 123,325.25 |
| Heavy furniture for staff residences (C.M. 2378) | 14,388.25 | ........ | 6,209.07 |
| Library (C.M. 2334, 2411, 2433, 2440). | 825.01 | 55,966.96 | 41,441.52 |
| Operation in China | | | |
| Budget 1918–19 (C.M. 2377)...... | 8,529.53 | ........ | ........ |

EXHIBIT J—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MEDICAL EDUCATION (*Cont'd*) | | | |
| Medical Schools—Affiliated (*Cont'd*) | | | |
| Operations in China (*Cont'd*) | | | |
| Budget 1919–20 (C.M. 2341, 2412, 2493)...... | $106,843.38 | $251,000.00 | $357,125.43 |
| Budget 1920–21 (C.M. 2441)...... | ........ | 350,000.00 | 115,254.05 |
| Peking American School (C.M. 2442) | ........ | 50,000.00 | ........ |
| Expenses in America | | | |
| July 1, 1919, to June 30, 1920 (C.M. 2342, 2426)...... | 2,243.58 | 5,000.00 | 5,172.63 |
| July 1, 1920, to June 30, 1921 (C.M. 2481, 2475)...... | ........ | 10,000.00 | 5,507.50 |
| Shanghai Medical School asset accounts | | | |
| Purchase of land (C.M. 2110, 2269, 2429)...... | 193,022.84 | ........ | 18,607.58 |
| Buildings and fixed equipment (C.M. 2270, 2413). | 18,271.62 | 50,000.00 | 4,102.89 |
| Movable equipment (C.M. 2271)...... | 5,000.00 | ........ | 39.76 |
| Accessories (C.M. 2272) | 4,960.24 | ........ | ........ |
| Library (C.M. 2215)...... | 2,376.15 | ........ | 47.20 |
| Operation | | | |
| Budget 1918–19 (C.M. 2259, 2277). | 5,268.88 | ........ | 1,010.81 |

EXHIBIT J—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| TRANSLATION | | | |
| National Medical Association of China (C.M. 2453) For expenses connected with their participation in the terminology committee. Mex. $500 per year for five years beginning 1920. (Instalment due 1920) | ........ | $600.00 | $395.90 |
| Publication committee of the China Medical Missionary Association (C.M. 2423) For use in translation work. Mex. $10,000 per year for two years beginning 1919. (Instalment due 1919) | $12,000.00 | ........ | 10,723.86 |
| (Instalment due 1920) | ........ | 12,000.00 | ........ |
| FELLOWSHIPS | 22,148.93 | 19,550.00 | 22,227.85 |
| SCHOLARSHIPS | 11,855.29 | 8,420.00 | 6,867.40 |
| MISCELLANEOUS | | | |
| North China Union Language School (C.M. 2422) Toward cost of recitation building and library. Mex. $40,000 | ........ | 45,000.00 | ........ |

EXHIBIT J—*Continued*

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| MISCELLANEOUS (*Cont'd*) | | | |
| Smithsonian Institution (C.M. 2431) For studies in physical anthropology in China and other countries..... | ........ | $2,500.00 | $2,500.00 |
| ADMINISTRATION | | | |
| Peking Office (C.M. 2424–2473)... | $6,612.72 | 41,303.48 | 28,021.82 |
| Home Office (C.M. 2425)........ | ........ | 40,716.00 | 28,240.65 |
| TOTALS.... | $1,775,618.53 | $4,249,228.23 | $3,641,595.90 |
| Unexpended balances of appropriations allowed to lapse... | 340,758.83 | 338,173.87 | ............ |
| NET TOTALS[1] | $1,434,859.70 | $3,911,054.36 | $3,641,595.90 |

[1] The Foundation appropriated to the China Medical Board for its work during the year 1920 the sum of $4,105, 550.

## EXHIBIT K

### SUMMARY OF APPROPRIATIONS AND PAYMENTS

| | PRIOR APPROPRIATIONS | 1920 APPROPRIATIONS | 1920 PAYMENTS |
|---|---|---|---|
| International Health Board. | $360,436.23 | $2,420,099.41 | $1,623,375.20 |
| China Medical Board ....... | 1,434,859.70 | 3,911,054.36 | 3,641,595.90 |
| Medical Education .......... | 9,452.05 | 1,014,096.66 | 836,328.10 |
| Mental Hygiene ............ | 3,843.27 | 109,000.00 | 93,509.95 |
| Research in Physics and Chemistry .................... | 3,542.11 | 120,000.00 | 50,466.77 |
| School of Hygiene and Public Health .................. | 309,650.78 | 324,154.00 | 330,220.55 |
| War Work .................. | 55,839.27 | ........ | 20,663.97 |
| Miscellaneous .............. | 35,225.78 | 1,320,031.91 | 276,603.11 |
| Administration .............. | 4,722.30 | 200,370.42 | 205,092.72 |
| Totals | $2,217,571.49 | $9,418,806.76 | $7,077,856.27 |

| | | |
|---|---|---|
| Prior Appropriations ........................ | $2,217,571.49 | |
| 1920 Appropriations ........................ | 9,418,806.76 | |
| Total Appropriations .................................. | | $11,636,378.25 |
| 1920 Payments .......................................... | | 7,077,856.27 |
| Balance Payable on Appropriations ........................ | | $4,558,521.98 |

EXHIBIT K—*Continued*

In addition to the foregoing, the Foundation has made pledges and appropriations which become effective in future years,[1] and will require for payment the following amounts

| | | |
|---|---|---|
| YEAR 1921: | | |
| INTERNATIONAL HEALTH BOARD | $2,500,000.00 | |
| CHINA MEDICAL BOARD | 1,815,787.00 | |
| MEDICAL EDUCATION | 4,571,250.00 | |
| MENTAL HYGIENE | 103,500.00 | |
| RESEARCH IN PHYSICS AND CHEMISTRY | 115,000.00 | |
| SCHOOL OF HYGIENE AND PUBLIC HEALTH | 250,000.00 | |
| MISCELLANEOUS | 354,472.44 | |
| | | $9,710,009.44 |
| YEAR 1922 | | 3,229,226.13 |
| YEAR 1923 | | 2,005,551.00 |
| YEAR 1924 | | 2,531,726.00 |
| YEAR 1925 | | 1,083,600.00 |
| YEAR 1926 | | 35,000.00 |
| | | $18,595,112.57 |

[1] Full information in connection with these pledges is contained in the President's Review.

## EXHIBIT L

Statement of Appropriations and Payments of Special Funds During the Year 1920

| | Appropriations | Payments |
|---|---|---|
| **Estate of Laura S. Rockefeller Fund** | | |
| (R.F. 2454) Fifth Avenue Baptist Church | $212,688.86 | $184,000.00 |
| **Laura S. Rockefeller Fund** | | |
| (R.F. 2444) Baptist Home for the Aged of New York City | $500.00 | $500.00 |
| (R.F. 2442) Baptist Home of Northern Ohio | 500.00 | 500.00 |
| (R.F. 2443) Euclid Avenue Baptist Church of Cleveland, Ohio | 1,500.00 | 1,500.00 |
| (R.F. 2441) Ministers and Missionaries Benefit Board of the Northern Baptist Convention | 500.00 | 500.00 |
| | $3,000.00 | $3,000.00 |
| **John D. Rockefeller Fund** | | |
| (R.F. 2445, 2446) Baptist Home for the Aged of New York City | $1,850.00 | $1,850.00 |

## EXHIBIT M

## STATEMENTS OF PRINCIPAL FUNDS

### General Fund

| | |
|---|---|
| Balance of Mr. Rockefeller's gifts December 31, 1920 | $171,204,624.50 |

The whole fund is invested in securities (Exhibit P).

### Reserve

| | |
|---|---|
| Balance December 31, 1919 | $2,712,670.96 |
| Gain on securities sold and redeemed during the year ending December 31, 1920 (Exhibit O) | 398,617.60 |
| Total | 3,111,288.56 |

The whole fund is invested in securities (Exhibit P).

### Laura S. Rockefeller Funds

| | |
|---|---|
| Gifts comprising four separate funds | $49,300.00 |

The total of these funds is invested in securities (Exhibit Q).

### John D. Rockefeller Fund

| | |
|---|---|
| Gifts | $37,000.00 |

The whole fund is invested in securities (Exhibit Q).

### Henry Sturgis Grew Memorial Fund

| | |
|---|---|
| Gift to Harvard Medical School of China, transferred to the Foundation in trust | $25,000.00 |

The whole fund is invested in securities (Exhibit Q).

### Arthur Theodore Lyman Endowment

| | |
|---|---|
| Amount received from Harvard Medical School of China and held as a principal fund for Shanghai Medical School | $5,500.00 |

The whole fund is invested in securities (Exhibit Q).

## EXHIBIT N

## LAND, BUILDINGS, AND EQUIPMENT FUNDS

| | NET EXPENDITURES TO DECEMBER 31, 1919 | EXPENDITURES 1920 | NET EXPENDITURES TO DECEMBER 31, 1920 |
|---|---|---|---|
| THE ROCKEFELLER FOUNDATION | | | |
| Grand Chenier Wild Life Refuge | $243,999.70 | $4,421.02 | ........ |
| This property was deeded to the state of Louisiana in accordance with resolutions of the Board dated December 3, 1919, September 28, 1920, and January 21, 1921, at a book value of $248,420.72. | | | |
| Library | 2,094.90 | 466.66 | $2,561.56 |
| Equipment | 14,849.86 | 6,919.33 | 21,769.19 |
| TOTAL, The Rockefeller Foundation | $260,944.46 | $11,807.01 | $24,330.75 |
| CHINA MEDICAL BOARD | | | |
| Peking Union Medical College: | | | |
| Original purchase | $178,772.77 | ........ | $178,772.77 |
| Additional land | 180,087.78 | $9,938.62 | 190,026.40 |
| New buildings | 3,872,643.57 | 2,405,959.59 | 6,278,603.16 |
| Alterations—original buildings | 81,353.92 | 17,411.38 | 98,765.30 |
| Movable equipment | 42,742.62 | 167,900.42 | 210,643.04 |
| Accessories | 40,931.79 | 123,325.25 | 164,257.04 |
| Heavy furniture for staff residences | 611.75 | 6,209.07 | 6,820.82 |
| Library | 23,208.03 | 41,441.52 | 64,649.55 |
| TOTAL, Peking Union Medical College | $4,420,352.23 | $2,772,185.85 | $7,192,538.08 |
| Shanghai Medical School: | | | |
| Land | $251,977.16 | $18,607.58 | $270,584.74 |
| New buildings | 31,728.38 | 4,102.89 | 35,831.27 |
| Movable equipment | ........ | 39.76 | 39.76 |
| Accessories | 39.76 | ........ | 39.76 |
| Library | 623.85 | 47.20 | 671.05 |
| TOTAL, Shanghai Medical School | $284,369.15 | $22,797.43 | $307,166.58 |
| Harvard Medical School | $28,800.00 | ........ | $28,800.00 |
| TOTAL, China Medical Board | $4,733,521.38 | $2,794,983.28 | $7,528,504.66 |
| GRAND TOTAL | $4,994,465.84 | $2,806,790.29 | $7,552,835.41 |

EXHIBIT N—*Continued*

LAND, BUILDINGS, AND EQUIPMENT FUNDS—*Continued*

SUMMARY

| | |
|---|---|
| Expenditures | |
| To December 31, 1919 | $4,994,465.84 |
| Year 1920 | 2,806,790.29 |
| TOTAL | $7,801,256.13 |
| Grand Chenier Tract deeded to state of Louisiana | 248,420.72 |
| NET TOTAL DECEMBER 31, 1920 | $7,552,835.41 |

# EXHIBIT O

## STATEMENTS OF TRANSACTIONS RELATING TO INVESTED FUNDS

### General Fund

### Securities Sold, Redeemed, or Exchanged

| | NAME | RATE PER CENT | TOTAL PROCEEDS | | |
|---|---|---|---|---|---|
| $600,000 | Anglo-French External Loan | 5 | $599,250.00 | Gain | $22,732.80 |
| $500,000 | Consolidated Gas Co. Convertible Debenture | 6 | 500,000.00 | Loss | 50,000.00 |
| $36,000 | New York Central Lines Equipment Trust | $4\frac{1}{2}$ | 36,000.00 | Gain | 345.85 |
| $500,000 | Province of Quebec Five-Year Notes | 5 | 500,000.00 | Gain | 1,250.00 |
| $81,000 | Sunday Creek Co. Collateral Trust: | 5 | | | |
| | Exchanged, under reorganization plan, for $668\frac{1}{4}$ shares Kanawha & Hocking Coal & Coke Co. and $2,400.03 in cash | | 63,180.00 | | |
| $350,000 | United Kingdom of Great Britain and Ireland Five-Year | $5\frac{1}{2}$ | 345,275.00 | Gain | 962.50 |
| $50,000 | Wheeling & Lake Erie R.R. Equipment Trust Series "B" | 5 | 50,000.00 | Gain | 125.00 |
| 156 | Shares Borne Scrymser Co. Capital | | 69,858.03 | Gain | 23,838.03 |
| 220 | Shares Chehalis & Pacific Land Co.: Liquidating dividend of $1.75 per share, credited to cost of stock | | 385.00 | | |
| 150 | Shares Continental Oil Co. Capital | | 93,932.50 | Gain | 65,432.50 |
| | Continental Oil Co.: The rights to subscribe to $2,283\frac{1}{3}$ shares new stock sold | | 22,317.39 | | |
| 4,000 | Shares National Lead Co. Common | | 330,617.78 | Gain | 130,617.78 |
| 426 | Shares Solar Refining Co. Capital | | 162,524.23 | Gain | 83,710.99 |
| 52 | Shares Standard Oil Co. (Kansas) | | 32,740.78 | Gain | 18,440.70 |
| 142 | Shares Standard Oil Co. (Kentucky) | | 63,071.69 | Gain | 53,095.17 |

EXHIBIT O—*Continued*

STATEMENT OF TRANSACTIONS RELATING TO INVESTED FUNDS—*Continued*

GENERAL FUND—*Continued*

SECURITIES SOLD, REDEEMED, OR EXCHANGED—*Continued*

| | NAME | TOTAL PROCEEDS | | |
|---|---|---|---|---|
| 4,000 | Shares Standard Oil Co. (New Jersey) Cumulative Preferred | $415,873.35 | Gain | $4,381.83 |
| | Standard Oil Co. (New Jersey): Value of rights to subscribe to 49,000 shares new Preferred, charged against said Preferred and credited to cost of Common (See contra) | 24,500.00 | | |
| | Standard Oil Co. (Ohio): Value of rights to subscribe to 17,088 shares new Preferred, charged against said Preferred and credited to cost of Common (See contra) | 102,528.00 | | |
| 132 | Shares Standard Oil Co. (Ohio) | 70,612.45 | Gain | 43,684.45 |
| | Union Tank Car Co: Value of rights to subscribe to 24,000 shares new Preferred, sold and proceeds credited to cost of Common | 73,912.03 | | |
| 300 | Shares Woman's Hotel Co.: Received 50% liquidating dividend | 15,000.00 | | |
| | TOTALS | $3,571,578.23 | | $398,617.60 |

## EXHIBIT O—*Continued*

### Securities Purchased or Received through Exchange

| | NAME | PRICE PER CENT | COST |
|---|---|---|---|
| 95 | Shares Cleveland Trust Co. | 225. | $21,375.00 |
| 13,700 | Shares Continental Oil Co., received in payment of 200% stock dividend on holdings of 6,850 shares | | |
| 668¼ | Shares Kanawha & Hocking Coal & Coke Co. This stock and $2,400.03 in cash were received under reorganization plan in exchange for $81,000 Sunday Creek Co. Collateral Trust 5% Bonds. The cash is credited to cost of old bonds and balance stated as cost of stock | 90.953 | 60,779.97 |
| 202½ | Shares Kanawha & Hocking Coal & Coke Co. Preferred, subscribed to under reorganization plan | 100. | 20,250.00 |
| 49,000 | Shares Standard Oil Co. (New Jersey) Preferred purchased, from the Company at $100 per share, to which has been added the market value of rights at 50 cents per share | 100.5 | 4,924,500.00 |
| 17,088 | Shares Standard Oil Co. (Ohio) 7% Preferred, purchased from the Company at $100 per share, to which has been added the market value of rights at $6.00 per share | 106. | 1,811,328.00 |
| | Total | | $6,838,232.97 |

## EXHIBIT P

### SCHEDULE OF SECURITIES IN GENERAL FUND ON DECEMBER 31, 1920, REPRESENTING BOTH PRINCIPAL AND INCOME TEMPORARILY INVESTED

### BONDS

| Name | Rate Per Cent | Date of Maturity | Amount | Price Per Cent | Cash Price |
|---|---|---|---|---|---|
| American Agricultural Chemical Co. First Mortgage Convertible | 5 | Oct. 1928 | $310,000 | 101. | $313,100.00 |
| American Telephone & Telegraph Co. Thirty-Year Collateral Trust | 5 | Dec. 1946 | 100,000 | 97.75 | 97,750.00 |
| Armour & Co. Real Estate First Mortgage | 4½ | June 1939 | 1,000,000 | 93.25 | 932,500.00 |
| Ashland Power Co. First Mortgage | 5 | Mar. 1928 | 8,000 | 100. | 8,000.00 |
| Atlantic & Birmingham Ry. First Mortgage | 5 | Jan. 1934 | 677,000 | 90. | 609,300.00 |
| Baltimore & Ohio R.R. Refunding and General Mortgage | 5 | Dec. 1995 | 650,000 | 99.75 | 648,375.00 |
| Chicago & Alton R.R. Refunding Mortgage | 3 | Oct. 1949 | 551,000 | 65. | 358,150.00 |
| Chicago & Alton Ry. First Lien | 3½ | July 1950 | 854,000 | 53. | 452,620.00 |
| Chicago City & Connecting Railways Collateral Trust | 5 | Jan. 1927 | 1,305,000 | 85. | 1,109,250.00 |
| Chicago & Eastern Illinois R.R. Refunding and Improvement Mortgage | 4 | July 1955 | 300,000 | 63. | 189,000.00 |
| Chicago, Milwaukee & St. Paul Ry. General Mortgage Series "A" | 4 | May 1989 | 30,000 | 97. | 29,100.00 |
| Chicago, Milwaukee & St. Paul Ry. General Mortgage Series "C" | 4½ | May 1989 | 500,000 | 103. | 515,000.00 |
| Chicago, Milwaukee & St. Paul Ry. Debenture | 4 | July 1934 | 450,000 | 88.2838 | 397,277.50 |

| | | | | | |
|---|---|---|---|---|---|
| Chicago, Milwaukee & St. Paul Ry. General and Refunding Mortgage Series "A" | 4½ | Jan. 2014 | 500,000 | 91.0625 | 455,312.50 |
| Chicago & North Western Ry. Extension | 4 | Aug. 15 '26 | 50,000 | 95. | 47,500.00 |
| Chicago & North Western Ry. Sinking Fund Debenture | 5 | May 1933 | 80,000 | 102. | 81,600.00 |
| Chicago Railways Co. First Mortgage | 5 | Feb. 1927 | 500,000 | 97. | 485,000.00 |
| Cleveland, Cincinnati, Chicago & St. Louis Ry., St. Louis Division Collateral Trust | 4 | Nov. 1990 | 73,000 | 90. | 65,700.00 |
| Cleveland, Cincinnati, Chicago & St. Louis Ry. General | 4 | June 1993 | 700,000 | 83.893 | 587,250.00 |
| Cleveland Short Line Ry. First Mortgage | 4½ | Apr. 1961 | 500,000 | 95. | 475,000.00 |
| Colorado Industrial Co. First Mortgage | 5 | Aug. 1934 | 2,000,000 | 80. | 1,600,000.00 |
| Dominion of Canada, Government of, Fifteen-Year | 5 | Apr. 1931 | 500,000 | 94.565 | 472,825.00 |
| Erie R.R. General Mortgage Convertible Fifty-Year Series "B" | 4 | Apr. 1953 | 1,065,000 | 74.7175 | 795,742.30 |
| Illinois Central R.R. Refunding Mortgage | 4 | Nov. 1955 | 300,000 | 87. | 261,000.00 |
| Interborough Rapid Transit Co. First Mortgage | 5 | Jan. 1966 | 1,750,000 | 96.8571 | 1,695,000.00 |
| International Mercantile Marine Co. First and Collateral Trust Sinking Fund | 6 | Oct. 1941 | 2,848,290 | 97.5 | 2,777,082.75 |
| Lake Erie & Western R.R. Second Mortgage | 5 | July 1941 | 100,000 | 100. | 100,000.00 |
| Lake Shore & Michigan Southern Ry. First Mortgage | 3½ | June 1997 | 926,000 | 87. | 805,620.00 |
| Lake Shore & Michigan Southern Ry. Debenture | 4 | May 1931 | 1,673,000 | 92. | 1,539,160.00 |
| Magnolia Petroleum Co. First Mortgage | 6 | Jan. 1937 | 1,809,000 | 100. | 1,809,000.00 |
| Missouri, Kansas & Texas Ry. General Mortgage Sinking Fund | 4½ | Jan. 1936 | 1,325,000 | 84. | 1,113,000.00 |
| Morris & Essex R.R. First and Refunding Mortgage | 3½ | Dec. 2000 | 175,000 | 82.75 | 144,812.50 |
| Mutual Fuel Gas Co. First Mortgage | 5 | Nov. 1947 | 250,000 | 100. | 250,000.00 |

EXHIBIT P—*Continued*

SCHEDULE OF SECURITIES—*Continued*

BONDS

| Name | Rate Per Cent | Date of Maturity | Amount | Price Per Cent | Cash Price |
|---|---|---|---|---|---|
| National Railways of Mexico Prior Lien Fifty-Year Sinking Fund with January, 1915, and subsequent coupons attached | 4½ | July 1957 | $50,000 | 59. | $29,500.00 |
| Secured 6% Notes for coupon due January 1, 1914 | | Jan. 1917 | 1,125 | 59. | 663.75 |
| Guaranty Trust Co. Receipt for July 1, 1914, coupon | | | 1,125 | 59. | 663.75 |
| New Orleans, Texas & Mexico Ry. Non-Cumulative Income Series "A" | 5 | Oct. 1935 | 180,000 | 42. | 75,600.00 |
| New York Central Lines Equipment Trust of 1913 | 4½ | Jan. '21–'28 | 288,000 | 99.039 | 285,233.21 |
| New York Central & Hudson River R.R. Thirty-Year Debenture | 4 | May 1934 | 330,000 | 88.45 | 291,885.00 |
| New York, Chicago & St. Louis R.R. First Mortgage | 4 | Oct. 1937 | 35,000 | 95. | 33,250.00 |
| New York, Chicago & St. Louis R.R. Debenture | 4 | May 1931 | 1,303,000 | 87. | 1,133,610.00 |
| New York City Corporate Stock | 4¼ | Mar. 1964 | 100,000 | 94.5 | 94,500.00 |
| New York Connecting R.R. First Mortgage | 4½ | Aug. 1953 | 500,000 | 95.69073 | 478,453.65 |
| Northern Pacific Ry. Refunding and Improvement Mortgage | 4½ | July 2047 | 390,000 | 91.577 | 357,150.00 |
| Pennsylvania R.R. Consolidated Mortgage Sterling | 4 | May 1948 | £2,400 | 99. | 11,880.00 |
| Pennsylvania R.R. General Mortgage | 4½ | June 1965 | $1,500,000 | 98.25 | 1,473,750.00 |
| Philadelphia Co. Convertible Debenture | 5 | May 1922 | 1,000,000 | 97. | 970,000.00 |
| Pittsburg, Cincinnati, Chicago & St. Louis Ry. Consolidated Mortgage Series "I" | 4½ | Aug. 1963 | 500,000 | 103. | 515,000.00 |

| | | | | | |
|---|---|---|---|---|---|
| Reading Co.—Philadelphia & Reading Coal & Iron Co. General Mortgage | 4 | Jan. 1997 | 500,000 | 94.25 | 471,250.00 |
| Rutland R.R. First Consolidated Mortgage | 4½ | July 1941 | 25,000 | 90. | 22,500.00 |
| St. Louis-San Francisco Ry. Prior Lien Series "A" | 4 | July 1950 | 1,500,000 | 72.75 | 1,091,250.00 |
| St. Louis-San Francisco Ry. Adjustment Mortgage | 6 | July 1955 | 500,000 | 81.975 | 409,875.00 |
| Seaboard Air Line Ry. Adjustment Mortgage | 5 | Oct. 1949 | 455,000 | 77. | 350,350.00 |
| Southern Pacific R.R. First and Refunding Mortgage | 4 | Jan. 1955 | 100,000 | 86. | 86,000.00 |
| United States Fourth Liberty | 4¼ | Oct. 15 '38 | 1,075,000 | 93.21347 | 1,002,044.80 |
| United States Second Liberty Converted | 4¼ | Nov. 15 '42 | 2,100,000 | 93.00921 | 1,953,193.40 |
| Wabash R.R. Second Mortgage | 5 | Feb. 1939 | 120,000 | 97.8 | 117,360.00 |
| Washington Ry. & Electric Co. Consolidated Mortgage | 4 | Dec. 1951 | 450,000 | 83.5 | 375,750.00 |
| Western Maryland R.R. First Mortgage | 4 | Oct. 1952 | 1,032,000 | 78.8913 | 814,158.76 |
| Wheeling & Lake Erie R.R. Lake Erie Division First Mortgage | 5 | Oct. 1926 | 140,000 | 100. | 140,000.00 |
| Wheeling & Lake Erie R.R. Equipment Trust Series "B" | 5 | Apr.'21–'27 | 350,000 | 99.75 | 349,125.00 |
| Wilson Realty Co. First Mortgage | 6 | July 1929 | 7,500 | 95. | 7,125.00 |
| TOTAL BONDS | | | | | $34,161,148.87 |

EXHIBIT P—*Continued*

SCHEDULE OF SECURITIES—*Continued*

STOCKS

| Name | 1920 Dividend Rate Per Cent | Number of Shares | Price Per Share | Cash Price |
|---|---|---|---|---|
| American Ship Building Co. Preferred | 7 | 9,303 | 85. | $790,755.00 |
| American Ship Building Co. Common | 16 | 14,957 | 35. | 523,495.00 |
| Anglo-American Oil Co., Ltd. (Par £1) Capital | 30 | 366,517 | 30.5 | 11,178,768.50 |
| Atchison, Topeka & Santa Fe Ry. Preferred | 5 | 5,000 | 98.25 | 491,250.00 |
| Atchison, Topeka & Santa Fe Ry. Common | 6 | 21,100 | 95.2563 | 2,009,908.33 |
| Borne-Scrymser Co. Capital | 20 | 144 | 295. | 42,480.00 |
| The Buckeye Pipe Line Co. (Par $50) Capital | 16 | 49,693 | 160. | 7,950,880.00 |
| Central National Bank of Cleveland Capital | 12 | 500 | 159.2222 | 79,611.10 |
| Chehalis & Pacific Land Co. Capital | | 220 | 35.1245 | 7,727.40 |
| Chesebrough Manufacturing Co. Consolidated Common | 14 | 2,070 | 220.5025 | 456,440.30 |
| Chicago City & Connecting Ry. Participation Certificates Preferred | | 17,530 | 69.1875 | 1,212,856.88 |
| Chicago City & Connecting Ry. Participation Certificates Common | | 10,518 | 30. | 315,540.00 |
| Cleveland Arcade Co. Capital | 10 | 2,500 | 98.6222 | 246,555.56 |
| Cleveland Trust Co. Capital | 12 | 381 | 234.904 | 89,498.77 |
| Colorado & Southern Ry. First Preferred | 4 | 7,000 | 54. | 378,000.00 |
| Consolidated Gas Co. of N. Y. Capital | 7 | 20,000 | 127.5 | 2,550,000.00 |
| The Continental Oil Co. Capital | 9 | 20,550 | 62.2473 | 1,279,182.61 |
| The Crescent Pipe Line Co. (Par $50) Capital | 6 | 14,120 | 60. | 847,200.00 |

| | | | | |
|---|---|---|---|---|
| Cumberland Pipe Line Co. Capital | 12 | 3,000 | 81.333 | 244,000.00 |
| Erie R.R. First Preferred | | 21,400 | 45.8306 | 980,773.76 |
| Eureka Pipe Line Co. Capital | 13 | 12,357 | 361.3331 | 4,464,995.59 |
| Galena Signal Oil Co. Preferred | 8 | 4,193 | 139.7 | 585,779.50 |
| Galena Signal Oil Co. Common | | 20,000 | 189.7031 | 3,794,059.59 |
| Great Lakes Towing Co. Preferred | 7 | 1,527 | 88.7361 | 135,500.05 |
| Great Lakes Towing Co. Common | 5 | 1,200 | 12. | 14,400.00 |
| Indiana Pipe Line Co. (Par $50) Capital | 20 | 24,845 | 125.111 | 3,108,385.28 |
| Kanawha & Hocking Coal & Coke Co. Preferred | 7 | 202 1/4 | 100. | 20,250.00 |
| Kanawha & Hocking Coal & Coke Co. Common | | 668 1/4 | 90.953 | 60,779.97 |
| Manhattan Ry. Capital | 7 | 10,000 | 128.775 | 1,287,750.00 |
| Missouri Pacific R.R. Voting Trust Certificates for Convertible Preferred | | 21,980 | 55.5 | 1,219,890.00 |
| National Lead Co. Preferred | 7 | 1,100 | 104. | 114,400.00 |
| National Lead Co. Common | 6 | 10,000 | 50. | 500,000.00 |
| National Transit Co. (Par $12.50) Capital | 30 | 126,481 | 28.5 | 3,604,708.50 |
| New York, Chicago & St. Louis R. R. Second Preferred | 7 1/2 | 400 | 78.70 | 31,480.00 |
| New York, Chicago & St. Louis R. R. Common | | 100 | 55. | 5,500.00 |
| New York Transit Co. Capital | 20 | 12,392 | 300. | 3,717,600.00 |
| Northern Pacific Ry. Common | 7 | 700 | 91.7625 | 64,233.75 |
| Northern Pipe Line Co. Capital | 10 | 9,000 | 110. | 990,000.00 |
| Pere Marquette Ry. Preferred | | 5,740 4/5 | 54.56 | 313,248.00 |
| Provident Loan Society Certificates (Par $5,000) | 6 | 40 | 100. | 200,000.00 |
| Seaboard Air Line Ry. Preferred | | 4,300 | 54. | 232,200.00 |
| Seaboard Air Line Ry. Common | | 3,400 | 21. | 71,400.00 |
| Sheffield Farms Co., Incorporated Preferred | 6 | 150 | 99.4 | 14,910.00 |
| The Solar Refining Co. Capital | 50 | 4,538 | 185.007 | 839,561.76 |
| Southern Pipe Line Co. Capital | 17 | 24,845 | 229.5556 | 5,703,308.88 |
| South West Pennsylvania Pipe Lines Capital | 9 | 8,000 | 160. | 1,280,000.00 |

## EXHIBIT P—*Continued*

## SCHEDULE OF SECURITIES—*Continued*

### STOCKS

| Name | 1920 Dividend Rate Per Cent | Number of Shares | Price Per Share | Cash Price |
|---|---|---|---|---|
| Standard Oil Co. (Indiana) Capital | 28 | 29,718 | 867. | $25,765,506.00 |
| The Standard Oil Co. (Kansas) Capital | 24 | 4,914 | 275.016 | 1,351,433.05 |
| Standard Oil Co. (Kentucky) Capital | 12 | 14,726 | 70.2547 | 1,034,570.71 |
| Standard Oil Co. (Nebraska) Capital | 20 | 2,482 | 270. | 670,140.00 |
| Standard Oil Co. (New Jersey) Non-voting Cumulative Preferred | 7 | 55,000 | 102.872881 | 5,658,008.48 |
| Standard Oil Co. (New Jersey) Common | 20 | 49,000 | 729.5 | 35,745,500.00 |
| The Standard Oil Co. (Ohio) Common | 16 | 16,956 | 204. | 3,459,024.00 |
| The Standard Oil Co. (Ohio) Non-voting Cumulative Preferred | 7 | 17,088 | 106. | 1,811,328.00 |
| Superior Savings & Trust Co. Capital | 16 | 450 | 198.5555 | 89,350.00 |
| Tilden Iron Mining Co. Capital | 6 | 1,780 | 27.35 | 48,683.46 |
| Union Tank Car Co. Common | 7 | 24,000 | 66.917 | 1,606,087.97 |
| Virginia-Carolina Chemical Co. Common | 6 | 35,000 | 67. | 2,345,000.00 |
| Washington Oil Co. (Par $10) Capital | 20 | 1,774 | 30. | 53,220.00 |
| Western Maryland Ry. Second Preferred | | 500 | 46. | 23,000.00 |
| Western Pacific R. R. Corporation Preferred | 5 | 20,195 | 43.5 | 878,482.50 |
| Western Pacific R. R. Corporation Common | | 30,292½ | 15.25 | 461,960.62 |
| Wilson Realty Co. Capital | | 591 | 100. | 59,100.00 |
| Woman's Hotel Co. (In Liquidation) Capital | | 300 | 30. | 9,000.00 |
| Total Stocks | | | | $145,118,658.87 |

## EXHIBIT P—*Continued*

## SCHEDULE OF SECURITIES—*Continued*

### SUMMARY

| | |
|---|---|
| Bonds | $34,161,148.87 |
| Stocks | 145,118,658.87 |
| Total book value of investments belonging to General Fund, principal and income | $179,279,807.74 |

| | |
|---|---|
| The foregoing investments are apportioned as follows: | |
| General Fund | $171,204,624.50 |
| General Fund Income | 4,963,894.68 |
| Reserve | 3,111,288.56 |
| TOTAL | $179,279,807.74 |

## EXHIBIT Q

### SCHEDULE OF SECURITIES IN SPECIAL FUNDS ON DECEMBER 31, 1920

### John D. Rockefeller Fund

BONDS

| Name | Rate Per Cent | Date of Maturity | Amount | Price Per Cent | Cash Price |
|---|---|---|---|---|---|
| Canada Southern Ry. Consolidated Mortgage Series "A" | 5 | Oct. 1962 | $37,000 | 100. | $37,000.00 |
| Total Bonds | | | | | $37,000.00 |

### Laura S. Rockefeller Fund

BONDS

| Name | Rate Per Cent | Date of Maturity | Amount | Price Per Cent | Cash Price |
|---|---|---|---|---|---|
| Colorado Industrial Co. First Mortgage | 5 | Aug. 1934 | $50,000 | 80. | $40,000.00 |
| Virginia-Carolina Chemical Co. First Mortgage | 5 | Dec. 1923 | 10,000 | 93. | 9,300.00 |
| Total Bonds | | | | | $49,300.00 |

### Henry Sturgis Grew Memorial Fund

BONDS

| | | | | | |
|---|---|---|---|---|---|
| United States Second Liberty Converted | $4\frac{1}{4}$ | Nov. 15 '42 | $25,850 | 96.71167 | $25,000.00 |
| Total Bonds | | | | | $25,000.00 |

### Arthur Theodore Lyman Endowment

BONDS

| | | | | | |
|---|---|---|---|---|---|
| United States Fourth Liberty | $4\frac{1}{4}$ | Oct. 15 '38 | $5,850 | 94.01709 | $5,500.00 |
| Total Bonds | | | | | $5,500.00 |

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